PLUTONIUM USE POLICY

HEARING

BEFORE THE

SUBCOMMITTEE ON
ENERGY, NUCLEAR PROLIFERATION, AND
GOVERNMENT PROCESSES

OF THE

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GOVERNMENTAL AFFAIRS
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THURSDAY, SEPTEMBER 9, 1982

U.S. SENATE,
SUBCOMMITTEE ON ENERGY, NUCLEAR
PROLIFERATION AND GOVERNMENT PROCESSES,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
Washington, D.C.

The committee met at 1:35 p.m., in room 3302, Dirksen Senate Office Building, Hon. Charles H. Percy (chairman of the subcommittee) presiding.

Present: Senators Percy, Glenn, and Cohen.

OPENING STATEMENT OF SENATOR PERCY

Senator PERCY. I want to cordially welcome all of you to this hearing, and particularly our honored guests who are witnesses this afternoon.

This hearing of the Subcommittee on Energy, Nuclear Proliferation and Government Processes Subcommittee will focus on the Government's policy on the use of plutonium in nuclear fuel supplied by the United States to foreign countries.

In an effort to reduce the friction about U.S. policy on reprocessing spent nuclear fuel, and on the use of plutonium from U.S.-supplied fuel, the administration is changing the basic ground rules of that policy.

I strongly believe that U.S. policies on international trade should be stable and should be predictable. But they must also realistically address threats to the vital interests of the United States.

Likewise, I favor working in harmony with our allies and trading partners, of course. But on some things, we are bound to differ. Nonetheless, the differences we have had with our trading partners about reprocessing and plutonium use appear mild in comparison to the present controversy raging about providing equipment for the Soviet gas pipeline. President Reagan's decision on pipeline technology shows that he, too, is willing to make an abrupt shift in U.S. policy, to withhold technology, and to risk confrontation with our allies when he believes the cause is important enough. I, for one, believe that slowing the spread of nuclear weapons should be just as high an objective. I can't understand why the United States can't bring itself to being as tough on this point as it is on the pipeline. We have proven many times how we can be very tough and determined in a course of action that we set about. I don't know of anything more damaging and dangerous in the world than proliferation of nuclear weaponry.

The administration's plutonium use policy ostensibly discriminates between countries—by treating those allegedly posing no weapons risk in one way, and those which do pose such a risk in another—but I see only half of this policy reflected in the administration's plutonium use position. In it, we are publicly loosening controls for nations we can trust. But what about the other side of the equation? I am truly concerned—indeed, amazed—by the apparent willingness of this administration to engage in nuclear commerce with countries which have not forsworn the option to develop nuclear weapons.

If our policies are going to discriminate between countries, then we should be willing to call a spade a spade: for countries which are keeping this nuclear weapons option open, and which may be moving down the road toward building nuclear weapons, our controls should be ironclad.

Earlier this year, I raised questions about U.S. nuclear trade with countries like South Africa and Argentina, which have refused to sign the Treaty on Nonproliferation of Nuclear Weapons. I have yet to hear any satisfactory answers to the questions that I raised.

I am no stranger to international commerce, and I recognize the pressures which exist. But tight export controls are a vital part of our strategy: They must be administered in a tough-minded fashion. I will support the administration's attempts to develop sensible working relationships with other supplier nations and countries which adhere to the NPT, although the recent decisions on plutonium and reprocessing raise a number of troubling questions.

In particular, how confident can we be in the Congress that the administration would be prepared to say no to countries eager to obtain plutonium and develop reprocessing technology?

In this hearing today, I would like to learn as precisely as possible what the outer limits of this policy might be.

Our first witness this afternoon is Under Secretary of State, Richard Kennedy. Secretary Kennedy, in addition to his important responsibilities for management at the Department of State, has a key role in developing and implementing U.S. nonproliferation policy. He also serves as the U.S. representative to the International Atomic Energy Agency. In the past he has been of great help in presenting the views of the administration to the subcommittee.

Secretary Kennedy, we welcome you back warmly, and look forward to your testimony.

TESTIMONY OF RICHARD T. KENNEDY, UNDER SECRETARY OF STATE FOR MANAGEMENT, DEPARTMENT OF STATE, WASHINGTON, D.C.

Mr. KENNEDY. Thank you, very much, Mr. Chairman.

I genuinely appreciate the opportunity to come before the committee this afternoon to discuss recent developments in U.S. nonproliferation policy.

Let me start by echoing the concern which you expressed. There is no question in our mind, and the administration, certainly, that there can be no more dangerous possibility in the world than further proliferation of nuclear weapons.

We would hope that policies that we are pursuing, espousing, would hopefully put an end to that possibility.

I am particularly concerned and appreciative of the opportunity to discuss this afternoon the approach the administration is taking toward the repossessing of nuclear material subject to U.S. consent rights and the use of the plutonium produced from that material in certain countries.

The hearing comes at a particularly, especially, appropriate time, in view of the numerous misunderstandings of the reprocessing and plutonium use policy which President Reagan approved in June of this year.

It is very important to set the record straight on this matter since in my view our approach represents the most realistic and effective means of advancing our nonproliferation objectives at this time.

In the course of explaining what our policy on these issues is and what it is not, I will seek to answer the specific questions which you have asked.

In his July 16, 1981, message on nuclear cooperation and nonproliferation, President Reagan stressed a number of key themes. Two of these are particularly relevant to the administration's position on foreign reprocessing and plutonium use.

First, he stated that as one of the many elements of the administration's overall nonproliferation policy, the United States would continue to inhibit the transfer of sensitive nuclear material, equipment, and technology, particularly where the danger of proliferation demands.

Underlying this policy is a long-standing U.S. recognition of the serious risks associated with reprocessing and other sensitive technologies, the need for great caution and restraint in dealing with them, and the importance of limiting sensitive facilities and activities to as few locations as possible under adequate safeguards and only where there is no significant risk of proliferation.

The President also emphasized that an essential step in achieving our nonproliferation goals must be the reestablishment of this Nation as a reliable partner for nuclear cooperation under adequate safeguards.

In this connection, he announced that the United States will not inhibit or set back civil reprocessing and breeder reactor development abroad in nations with advanced nuclear power programs where it does not constitute a proliferation risk.

Consistent with this position, in June of this year, the President decided on a modified and limited approach toward the reprocessing of material subject to U.S. consent rights and the use of plutonium derived from that material in certain countries.

This approach is primarily designed to give our close allies in Euratom and Japan a firmer and more predictable basis upon which to plan their vital energy programs while at the same time furthering our nonproliferation objectives, including strengthened controls over civil plutonium.

Specifically, we are offering Japan and the countries of Euratom new, long term arrangements for implementation of U.S. consent rights over the reprocessing and use of material subject to our agreements for peaceful nuclear cooperation.

This advance, long term approval would apply only for facilities and activities which we determine meet our strict statutory criteria. We are also prepared to state our intention to consent to such activities in future programs when we have sufficient information about those programs to make the necessary determinations under our law.

These offers are being made in the context of seeking new or amended peaceful nuclear cooperation agreements with Japan and Euratom, which would be subject to congressional review. The approvals would be valid only as long as the conditions provided in the agreement, including nonproliferation and statutory conditions, continue to be met.

Our willingness to take these steps presumes the continued strong commitment of these countries to our common nonproliferation efforts and to developing and implementing more effective controls over plutonium.

Providing advance consent will not open the floodgates to the widespread use of plutonium, as has been alleged. We are proposing this arrangement only to those few nations which have well-defined and coherent, advanced nuclear programs and where reprocessing and plutonium use do not constitute a proliferation danger.

The President's decision limits the offer of advance consent for these activities, therefore, to Japan and the countries of Euratom, nations, which regard the use of plutonium as crucial to meeting their future nuclear energy needs.

Moreover, some of these countries already have reprocessing technology as well as active research, development, and demonstration programs for advanced nuclear fuel cycles using plutonium.

Our policy does not endorse or encourage the spread of reprocessing and plutonium; on the other hand, it recognizes that major programs already exist and that we must work realistically with our most important allies to insure vigorous safeguards and controls over sensitive technology and materials, and to otherwise advance our nonproliferation objectives.

This policy acknowledges that our close allies with advanced nuclear programs which pose no proliferation risk must be distinguished from others. Such a distinction is based upon genuine differences between countries, and we need to tailor our policies to deal with those differences.

Past efforts to challenge the carefully considered programs of Japan and Euratom countries led only to rancorous debates which soured our relations with key allies without enhancing our nonproliferation goals. At the same time we must and we will continue to hold the line against the spread of sensitive nuclear activities, particularly where the danger of proliferation demands.

Moreover, our approach would not entail a blanket endorsement of the programs of Japan and Euratom. We will grant advance consent for reprocessing and the use of plutonium only for those facilities and activities which we can determine satisfy the strict criteria contained in the Atomic Energy Act of 1954, as amended.

We are offering this approach in the context of seeking new or amended agreements and the law requires that the President must "determine in writing that the proposed agreement will promote,

and will not constitute an unreasonable risk to the common defense and security."

In addition, since the advance consent arrangement involves reprocessing, we will also determine before entering into the arrangement that our approval will not result in a significant increase of the risk of proliferation, as would be required under section 131 of the act. In making that determination foremost, consideration will be given to whether or not the reprocessing will take place under conditions that will insure timely warning to the United States of any diversion.

For other countries with which we have cooperation agreements, we will be working to provide advance, long-term consent for retransfers of U.S.-origin spent fuel to the United Kingdom and France for reprocessing in facilities which meet the applicable stratutory criteria.

Disposition of the recovered plutonium would be subject to further U.S. consent. Such arrangements will also be made in the context of seeking new or amended peaceful nuclear cooperation agreements.

During the past two administrations, requests for reprocessing or retransfer of plutonium were approved on a case-by-case basis. Past approvals have involved primarily reprocessing in Japan at Tokai Mura or the shipment of spent fuel from Japan and a few other countries to France and the United Kingdom for reprocessing. Both previous administrations and this administration have always approved such requests. However, the case-by-case approach was resented by these countries because it caused considerable uncertainty in their nuclear power planning.

The previous administration was, in fact, considering ways to reduce that uncertainty during its last year in office and was consulting with our key allies on possible approaches including the provision of more extended approvals.

Our approach is thus not a major break with past practices but a logical progression from them. It is also consistent with the approaches recently adopted toward Japan and Euratom by Canada and Austrialia which presently insist as a general policy on consent rights similar to our own.

Our approach includes as well an effort to strengthen our agreements for cooperation, safeguards and other controls on civil plutonium. As you know, the present agreements between the United States and Euratom do not provide for U.S. consent rights over the reprocessing of nuclear material which we export to the Community.

We are required by the Nuclear Non-Proliferation Act of 1978 to seek such consent rights in Euratom and to expand the ones we have presently with Japan. The countries of Euratom are not likely to agree to expanding existing ones unless they are confident that we will exercise those rights in a responsible and a predictable manner.

I believe our new approach will go a long way toward convincing these countries that their agreement to new or expanded consent rights will place our nuclear relations on a more sound and orderly basis.

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In addition, advance, long-term approval of reprocessing with Euratom and Japan is clearly premised on the expectation of strengthened and broadened cooperation on nonproliferation matters, particularly in dealing with pressing proliferation problems in sensitive regions of the world and in implementing more effective controls on civil plutonium. Such approvals would be premised on continued commitments to improve the application of IAEA safeguards at reprocessing plants and other facilities which process, use or store plutonium as well as commitments to assure adequate physical security measures for plutonium.

Such cooperation from the major advanced nuclear countries is essential if we are to succeed in strengthening these aspects of the nonproliferation regime.

The United States no longer enjoys a position as the monopoly supplier of nuclear materials equipment and technology. Today, in fact, we supply only some 35 percent of the non-Communist enrichment market whereas we accounted for virtually all of it just a few years ago. But if we are to have the full cooperation of the other advanced nuclear powers in pursuing our nonproliferation objectives, we cannot continue to press a policy which is hostile to their reprocessing and breeder programs or which needlessly creates uncertainties and difficulties for their nuclear power planning which affects capital investments in the billions of dollars. In that kind of atmosphere, U.S. proposals to modify the design features of those facilities to strengthen the application of safeguards and other steps to insure more rigorous controls on the use of plutonium would be viewed with skepticism, if not as an effort to undermine foreign reprocessing and breeder programs.

It is, therefore, in our view, essential that we take steps to remove the tensions that have marred our nuclear relations with our close allies over the past few years so that we can work more effectively together.

Turning to issues raised by the possible export of sensitive reprocessing technology and equipment, we are prepared to consider on a case-by-case basis specific requests for such transfers, but again only to Japan and Euratom. This is not a blanket approval. Rather, each request will be viewed on its merits and will be approved only if we judge it to be in our overall nonproliferation interest and if it meets the stringent requirements in U.S. law as well as those in the Suppliers Guidelines (INFCIRC 254).

Japan and Euratom will build such plants with or without our assistance. However, by cooperating with them we would expect to be able to work more effectively to influence IAEA safeguards and physical security measures applied to new facilities in Japan and Euratom. In particular, cooperation with our key allies can provide us the opportunity to work with them to minimize the proliferation risks associated with such facilities, most importantly, by designing plants to facilitate the application of safeguards. Thus, we would strongly oppose legislation prohibiting the export of such reprocessing technology.

Your letter of invitation to this hearing suggests that adequately safeguarding reprocessing plants and other facilities where large quantities of plutonium are present will be an increasing challenge for the IAEA and its member states. We share that view. For that

reason, it is all the more necessary, in our view, to work with our close allies in order to ensure improvements in safeguards at such facilities.

Turning to some of the detailed questions your letter raised, increased numbers of trained and experienced inspectors and new safeguards equipment and techniques should permit the IAEA to implement safeguards effectively at light water reactors involved in thermal recycle programs. In addition, we preceive no insurmountable problems which might forestall the development and implementation prior to breeder reactor commercialization of a safeguards approach for breeder reactors that ensures timely detection of diversion.

While the technology is available to safeguard small reprocessing plants currently under safeguards, the development and use of new safeguards techniques will be required for the large reprocessing plants planned by some countries.

For example, newly developed dynamic, or near-real time accounting techniques, involving frequent measurements of the material in process so that a material balance can be struck at short notice, may be an essential safeguards tool. Their use may require that appropriate instrumentation be designed into large reprocessing plants.

Continuous inspection—which the IAEA is now applying at Japan's Tokai reprocessing plant—will probably be necessary as well. New containment and surveillance equipment and techniques, including the concept of "extended" containment and surveillance, may also be needed to complement material accounting measures, for example, to help insure timely detection.

Similar techniques are likely to be required for effectively safeguarding large commercial mixed oxide fuel fabrication plants. Here, too, timely detection may require at least biweekly, and probably continuous, inspection regimes. New equipment such as nondestructive-assay equipment also will be needed to safeguard mixed oxide fuel fabrication facilities; it is currently in use or in the final stages of development. Similarly, new containment/surveillance equipment for such plants is being developed by several countries.

Safeguarding plutonium in storage facilities is well within the capabilities of existing item accounting and containment/surveillance measures. Achieving our goals for the timeliness of detection is likely to depend heavily on whether sufficient resources are available.

In this regard, if an effective international plutonium storage system is eventually established, it would provide increased assurance that excess separated plutonium remains adequately accounted for and is not diverted to a proscribed use.

Clearly there are major challenges ahead in assuring an adequate IAEA safeguards system for nuclear activities involving the use of plutonium in Japan and Euratom. But we cannot meet that challenge by trying to force these countries to eschew steps or options they regard as essential to their future energy security. On the contrary, we believe that our cooperative approach is the only credible and realistic way to obtain the international support needed to achieve our vital safeguard objectives.

You have asked that I address the relationship of the plutonium use policy to section 403 of the NNPA. That section calls on the President to seek international agreement to limit reprocessing to as few facilities as feasible under effective international auspices and inspection.

You also asked about section 129 of the Atomic Energy Act, which requires a termination of certain nuclear exports to any nation found by the President to have entered into an agreement for the transfer of reprocessing equipment, material or technology to a non-nuclear-weapon state, except pursuant to international agreement or understanding to which the United States subscribes.

Our policy is consistent with section 403. Seeking international auspices for and inspection of reprocessing facilities, and seeking to limit the number of such facilities, does not mean that there will be no reprocessing facilities. Reprocessing facilities already exist—and they will continue to be built—in Japan and in the Euratom countries. In addition, as I have noted, our policy affords us the opportunity to work with our allies to maximize the effectiveness of international inspection and to move in the direction of multinational involvement in such facilities, both prime objectives of section 403. Not least, a readiness to provide approval for reprocessing of U.S.-origin spent fuel in these plants on a longer term basis does not mean we will encourage such plants elsewhere, on the contrary.

Section 129(2)(C) requires termination of certain U.S. nuclear exports upon the entry into agreements between foreign nations for reprocessing transfers. However, in the period following the international nuclear fuel cycle evaluation [INFCE] this does not apply where the United States is prepared to certify that the terms and conditions in such an agreement are acceptable. The countries to which we would consider authorizing U.S. reprocessing technology exports are very limited and the requirements we would impose very stringent.

Obviously, if another country, for example, France, contemplates reprocessing exports to another Euratom country or to Japan, and under the same stringent conditions I have described as applicable to U.S. exports, the United States would be prepared to confirm the acceptability of the arrangement. The arrangement would then constitute an understanding to which the United States subscribes and the provisions in section 129(2)(C) would not be applicable.

Let me conclude, Mr. Chairman, by stressing once more that this administration's approach to reprocessing and plutonium use is a realistic and conservative one. It fully recognizes and understands the risks associated with plutonium, but it equally recognizes the fact that the United States will have consent rights over a decreasing amount of nuclear material worldwide and that we will have to rely increasingly on persuasion to achieve our nonproliferation objectives. Further, our new approach is based on our traditionally strict statutory criteria designed to ensure that our materials and technology are used only for peaceful purposes.

Mr. Chairman, I hope this discussion of the administration's policy toward foreign reprocessing and plutonium use has put the subject into better perspective. As we negotiate the specific arrangements which will implement the policy, I believe the Con-

gress will be convinced that it represents a measured and a prudent response to the needs of our major allies, while furthering our nonproliferation goals.

There is a firm consensus, shared by the Congress and this administration, that restraining the proliferation of nuclear explosives is one of our most important national policy objectives. That policy is firmly grounded in Federal law, which this administration is determined to implement effectively.

We may have some differences on tactical and procedural approaches to achieving our shared goals. That is to be expected. However, we are committed to working with you to develop a successful nonproliferation policy. In that regard, we will be keeping you and the subcommittee informed of significant developments in negotiations in implement this new policy.

This concludes my testimony, Mr. Chairman, and I will be pleased to answer questions from the committee at our conference.

Senator PERCY. Thank you very much, Secretary Kennedy, and we are delighted to have Senator Glenn join us today. We have worked together on this problem for so many years and have enjoyed our discussions in the State Department with you at your invitation in which, months ago, you indicated and have fulfilled the policy and objective of working together to find answers to these very, very perplexing problems. They are tough problems, there is no question, and we don't want to oversimplify them. Your commitment to continue to work together to make an effective, and develop an effective nonproliferation policy is appreciated.

Senator Glenn, I expressed somewhat my wish that we would have the same zeal in carrying forward our nonproliferation policy as we have in stopping the pipeline. When you compare the two in balance as to which is the greatest threat to mankind, there isn't any comparison.

Senator GLENN. I would hope we would be more consistent than that.

Senator PERCY. I do hope that together we can raise that very high in priority and I know the President puts very high in priority the problem of nuclear weaponry and its spread.

I think before going into questions, it might be best to have our second distinguished witness give his testimony.

I would suggest that I go down and vote and you chair, and I will relieve you then when we come back. I have gone through Secretary Davis' testimony and I think, rather than recess for 15 minutes, it would be better for us to keep our continuity.

Senator GLENN. I have a short statement.

Senator PERCY. Why don't you introduce Mr. Davis.

If you would be good enough to give your statement, that would be fine.

Senator GLENN. I am sorry we have some of these votes set up here after the hearings were scheduled, so it makes for a rather difficult time getting in and out. But I'm sure you understand that situation.

OPENING STATEMENT OF SENATOR GLENN

Senator GLENN. Today's hearing focuses, of course, on the Reagan adiministration's efforts to support reprocessing and plutonium use programs here and abroad. Whatever the limitations of our efforts during the latter part of the 1970's to halt the spread of this dangerous material and the weapons capability it provides, there was never any doubt as to the fact that the United States was deeply concerned over this and other aspects of the nonproliferation problem and that it would not shrink from raising issues of this kind to the highest levels with foreign governments when necessary. It seems to me that our leadership is little more than a shadow of that which we hoped it would be at this time. In case after case, rather than lending our prestige and energy to curbing the spread of sensitive technologis, we have looked the other way or sometimes joined in and provided assistance to the nuclear programs of potential proliferators.

I might say that twice in the last 2 years, I have sponsored Senate resolutions which have passed unanimously both times, asking the President to bring up the matter of nuclear transfers to non-nuclear weapon nations with the nuclear suppliers at the 1981 and 1982 Economic Conferences, first in Ottawa, and then in Versailles. Both times the wishes of the Congress were ignored; these vital matters were not brought up and discussed. So I don't know whether we are on the right track or not. I tend to think we are not.

The administration's international plutonium use policy proposal is being promoted at a time when the economic justification for reprocessing and plutonium use has all but evaporated. There was a time some years ago when we believed the world wide uranium supplies were insufficient: we though we were going to need reprocessing and need the plutonium extracted to extend fuel availability. But now we have surpluses of uranium around the world, and yet this is the time when the administration is promoting more plutonium extraction. Perhaps even more important, the United States will be making a significant concession in terms of its nonproliferation control policy and, as I see it, receiving very little in return; indeed, nothing in return.

Under President Reagan's 1981 nuclear policy statement, the United States is supposed to be seeking the agreement of Japan and our Western European trading partners that they will make nuclear exports only to nations that have accepted fullscope safeguards. Yet this potential quid pro quo is apparently not being discussed in the administration's negotiations to implement its liberalized plutonium use program.

Moreover, I believe, when examined closely, the administration's proposal for one-shot, long-term programmatic approvals of reprocessing and plutonium use is contrary to the Nonproliferation Act. Without going into all the details here, the text and legislative history of that act make clear that the Congress was fully aware of the longstanding practice of reviewing subsequent arrangements on a case-by-case basis.

One of the principal reforms Congress introduced in the act was to bring this approval process, which had long been handled behind

the scenes, into the public arena by requiring each subseqent arrangement to be justified publicly and to lay before Congress for 15 days of continuous session. This congressional oversight mechanism would be crippled if the United States were to grant a long-term generic approval which might last for a period of decades as the administration is apparently proposing.

The NNPA also established a tough standard for reviewing subsequent arrangements based upon a determination that they would not cause a significant increase in the risk of proliferation beyond that which existed at the time the approval was requested.

Given the practice at the time this provision was adopted, it is clear that Congress had in mind an examination of proliferation risk on a relatively frequent basis, with the issue to be evaluated each time a new subsequent arrangement request came forward. The administration's proposal, in contrast, would require the implausible finding the activities involving major quantities of weapons-usable plutonium were not going to increase proliferation risks for a period of up to 30 years. Such an inherently arbitrary determination is totally at odds with the kind of careful, ongoing scrutiny Congress intended for these transactions when it adopted the increased proliferation risk standard.

I also wanted to point out that while the act was being considered on the Senate floor, section 131 with subsequent arrangements was amended repeatedly by myself, Senator Percy, and Senator McClure to streamline the procedures for considering these approvals. As the debates make clear, our purpose was to try to gain the confidence of our trading partners, particularly Japan and the Western European countries, in the predictability of the approval process under the NNPA. These amendments would have been entirely unnecessary if these suppliers and retransferors could have bypassed the case-by-case approval process altogether through the mechanism being proposed by the administration.

Finally, the NNPA does refer to a type of generic approval process for subsequent arrangements, but one which incorporates case-by-case review on a highly expedited basis. This is contained in section 131a(3) which contemplates that in new agreements for cooperation, we would establish clear-cut terms and conditions for approving subsequent arrangements.

In effect, these terms and conditions would be clarifications of how the broad standard in the NNPA would be applied to particular activities in particular countries. It is crystal clear from language in the Senate report and from Senator McClure's explanation of this section that once an agreement was in place containing these terms and conditions, the case-by-case review of subsequent arrangements would still continue although on a highly expedited basis.

Under these circumstances, it is difficult, indeed, to argue that Congress intended the NNPA to authorize the Reagan proposal for a one-shot, decades-long programmatic approval in this critical field.

Negotiation, along the lines envisioned by the NNPA, of generic terms and conditions for reprocessing and plutonium use in new agreements for cooperation with the Japanese and others may in fact be desirable if we can get equal concessions in return, such as

a pledge to limit nuclear exports to nations accepting full-scope safeguards. In this way the United States would be committing itself to an overall policy that accepted specified plutonium-related activities, a considerable benefit to these supplier nations. But at the same time, the crucial case-by-case verification process mandated by the NNPA woud be preserved.

On the domestic side, I am deeply troubled that the administration seems to be committed to introducing to civilian reprocessing and plutonium use at all costs. There is simply no reason to commit this country to the dangerous and expensive plutonium path as long as safer and cheaper alternatives remain readily available as they are likely to be for decades to come.

The dangers of proceeding with plutonium are becoming increasingly apparant. Today, for example, the GAO released a major classified study prepared at my request showing the extremely serious shortcomings in security at our nuclear weapons production facilities.

I have written to the President urging budget and organizational changes to address the deficiencies and I would like that to be put into the record also. And, I am issuing a separate release on the GAO report today, pointing out the serious dangers it raises. It is truly a dreadful situation, where we needed money to upgrade our security at existing facilities in this country. These moneys were zeroed out in this year's budget—zeroed out of the DOE budget for 1983—even though we repeatedly found through the years we need more security emphasis.

With respect to the Barnwell plant, I am concerned that some at DOE are apparently contemplating yet another subsidy for the nuclear industry which will plainly come at the expense of other DOE R&D efforts.

Since President Reagan took office, DOE has slashed its budgets for solar and renewables R&D by 94 percent, and for fossil R&D on energy storage and electrical energy systems altogether. At the same time, nuclear fission R&D expenditures through fiscal year 1982 have actually increased. I would add that the $250 million being discussed for purchasing Barnwell plutonium is considerably more than the total combined fiscal year 1983 budget proposals for all the nonnuclear categories I just mentioned.

I would like that chart included in the record, that shows that.

Senator PERCY. It will be incorporated.

Senator GLENN. These priorities are totally mistaken. Starting the Barnwell plant, moreover, will inevitably produce a gross surplus of fuel grade plutonium that will overhang and further depress the uranium industry, where some thousands of miners are already out of work.

We will recess for approximately 15 minutes.

[Senator Glenn's prepared statement, letter to the President, and chart follow:]

PREPARED STATEMENT OF SENATOR JOHN GLENN

Mr. Chairman, today's hearing focusses on the Reagan Administration's policies encouraging the use of plutonium here and abroad. To date, this dangerous weapons-usable material has had only limited usage in civilian nuclear activities, mostly involving reprocessing in nuclear weapons states and small breeder reactor and sim-

ilar research activities. Since President Ford's nuclear policy statement in 1976, through the Carter Administration and the enactment of the NNPA, the United States has sought to limit the spread of reprocessing and plutonium use. In some cases, we were not as successful as I would have hoped. Pakistan for example, despite our efforts, has been able to obtain most of the components for a reprocessing facility, Iraq obtained hot cells from Italy, and reprocessing of U.S.-origin spent fuel in Japan and Western Europe has continued to move forward. While not necessarily posing a risk of proliferation in itself, this activity by the advanced nations legitimizes plutonium usage as a part of nuclear energy and will only make our efforts to curb the spread of plutonium around the world the more difficult.

Whatever the limitations of our efforts during the latter part of the 1970's to halt the spread of this dangerous material and the weapons capability that it provides, there was never any doubt as to the fact that the United States was deeply concerned over this and other aspects of the non-proliferation problem and that it would not shrink from raising issues of this kind to the highest levels with foreign governments when necessary. U.S. leadership in this regard is now little more than a shadow of its former self. In case after case, rather than lending our prestige and efforts to curbing the spread of sensitive technologies, we have looked the other way, or sometimes worse, actually joined in and provided assistance to the nuclear programs of potential proliferators. Repeatedly, we have pulled back from our efforts to curb nuclear sales to countries that have not accepted full-scope safeguards permitting and sometimes encouraging other suppliers to stand in for us and provide materiel to the countries involved whose export from the United States is prohibited by law.

The Reagan Administration's plutonium policies are but the most recent embodiment of its widespread effort to dismantle the barriers that had been so elaboratly erected by previous administrations against the spread of nuclear weaponry. Instead of careful case-by-case review subject to Congressional oversight of foreign requests to reprocess spent fuel and use the resulting plutonium as provided in the NNPA, the Administration proposes to approve such activities on a one-shot, long-term basis in effect reducing day-to-day U.S. controls over this most dangerous substance to a level far below that which applies to exports of low-enriched uranium which are scrutinized on a case-by-case basis. Domestically, the Administration presses on with the Clinch River Breeder Reactor and is now actively interested in reviving the Barnwell reprocessing plant through a system of government subsidized purchase guarantees. I believe both of these proposals are fundamentally unsound.

The Administration's international plutonium use policy proposal is being promoted at a time when the economic justification for reprocessing and plutonium use has all but evaporated. In effect, the Administration is encouraging these dangerous activities at the very time when U.S. efforts to discourage them might begin to bear fruit. Perhaps even more important, the United States will be making a significant concession in terms of its non-proliferation control policy and yet will receive nothing in return. We are actively seeking to gain the agreement of Japan and our Western European trading partners to make the acceptance of full-scope safeguards by recipient states a universal condition for nuclear exports. Indeed, the Congress, both this year and the last, specifically urged the President to raise this matter with these allies during the economic summits Ottawa and Versailles. He has not done so there and, apparently, this potential quid pro quo is not being discussed as the Administration moves forward to implement its liberalized plutonium use program.

Finally, I believe when examined closely, the Administration's proposal for one-shot, long-term programmatic approvals of reprocessing and plutonium use is contrary to the Non-proliferation Act. Without going into all the details here, the text and legislative history of that Act make clear that the Congress was fully aware of the long-standing practice of reviewing subsequent arrangements of a case-by-case basis. One of the principal reforms Congress introduced in the Act was to bring this approval process, which has long been handled behind the scenes, into the public arena by requiring each subsequent arrangement to be justified and to lay before Congress for 15 days of continuous session. This Congressional oversight mechanism would be crippled if the United States were to grant a long-term generic approval which might last for a period of decades as the Administration is apparently proposing. The NNPA also established a tough standard for reviewing subsequent arrangements based upon a determination that they would not cause a significant increase in the risk of proliferation beyond that which existed at the time the approval was requested. Given the practice at the time this provision was adopted, it is clear that Congress has in mind an examination of proliferation risk on essentially an ongoing basis, with the issue to be evaluated each time a new subsequent arrangement request came forward. The Administration's proposal would require an implausible

finding that proliferation risks from activities involving major quantities of weapons-usable plutonium were not going to increase for a period of up to 30 years. Such an inherently arbitrary determination is totally at odds with the kind of careful scrutiny Congress intended for these transactions involving weapons-usable material.

Let me also point out that while the Act was being considered on the Senate floor, Section 131 dealing with subsequent arrangements was amended repeatedly by myself, Senator Percy, and Senator McClure to streamline the procedures for considering these approvals. As the debates make clear, our purpose was to try to gain the confidence of our trading partners, particularly Japan and the Western European countries, in the predictability of the approval process under the NNPA. These amendments would have been entirely unnecessary if these suppliers and retransferors could have bypassed the case-by-case approval process altogether through the mechanism being proposed by the Administration. What was obviously assumed by all parties was that, to the contrary, the case-by-case approach was to be the exclusive method for approving subsequent arrangements and that for this reason, this method had to be simplified to the maximum extent feasible.

Finally, the NNPA does refer to a type of generic approval process for subsequent arrangements, but one which incorporates case-by-case review on a highly expedited basis. This is contained in Section 131a(3) which contemplates that in new agreements for cooperation, we would establish clear-cut terms and conditions for approving subsequent arrangements. In effect, these terms and conditions would be clarifications of how the standards in the NNPA would be applied to particular activities and particular countries. However, it is crystal clear from language in the Senate Report and from Senator McClure's explanation of this section that once an agreement was in place containing these terms and conditions, the case-by-case review of subsequent arrangements would still continue although on a highly expedited basis.

To summarize, Congress and the NNPA: (1) provided itself with a new mechanism for continually monitoring subsequent arrangements; (2) established a standard for verifying these transactions that focussed on increased proliferation risk at the time of the transaction; (3) streamlined the case-by-case review process to reduce concerns that Japan and Western European nations; and (4) explicitly set out a method for implementing generic policy on reprocessing and plutonium use that continue to employ the case-by-case review. It is inconceivable under these circumstances that the NNPA can be read to authorize the Reagan proposal for a one-shot, decades long programmatic approval that would undermine the Congressional oversight process in the NNPA, require proliferation risk judgments to be made arbitrarily on a 30-year time scale, make meaningless Congress's efforts to streamline the case-by-case review process, and totally disregard the explicit framework in the NNPA for implementation of a generic subsequent arrangement policy.

Negotiation of generic terms and conditions for reprocessing and plutonium use in new agreements for cooperation with the Japanese and others along the lines envisioned by the NNPA, may in fact, be desirable if we can set equal concession in return, such as a pledge to limit nuclear exports to nations accepting full-scope safeguards. In this way we would be committing ourselves to an overall policy that accepted plutonium-related activities, a considerable benefit to these nations. But at the same time, the crucial case-by-case verification process mandated by the NNPA would be preserved.

On the domestic side, I am deeply troubled that the Administration seems to be committed to introducing to civilian reprocessing and plutonium use at all costs. While I am prepared to agree that plutonium in spent reactor fuel constitutes a potentially important fuel resource for the future and I agree that we should continue with research and development on the breeder reactor (although not with the Clinch River demonstration plant), the fundamental point is that plutonium is dangerous and expensive. There is simply no reason to commit this country to the plutonium path as long as safer and cheaper alternatives are available. Fortunately our reserves of uranium are extensive and, indeed, there is a world-wide glut of this material with prices having fallen in the last several years by nearly 50%. For better or worse nuclear power growth is sharply down and there is little prospect for its resurgence at anything near the level used in the early 1970's to justify reprocessing, plutonium recycle, or early deployment of breeder reactors.

At the same time the dangers of proceeding with plutonium are becoming increasingly apparent. Today, for example, the GAO released a major classified study prepared at my request showing the extremely serious shortcomings in security at our nuclear weapons production facilities. Plainly, we are already having great trouble controlling plutonium even in the national security sector. To introduce it prematurely and unnecessarily into civilian use would be an error of major proportions.

With respect to the Barnwell plant, I am concerned that some at DOE are apparently contemplating yet another subsidy for the nuclear industry which will plainly come at the expense of other DOE efforts. Since President Reagan took office, DOE has slashed its budgets for solar and renewables R&D by 90 percent, for conservation R&D by 94 percent, and for fossil R&D by 90 percent, while it has sought to eliminate R&D on energy storage and electrical energy systems altogether. At the same time nuclear fission R&D expenditures through fiscal year 1982 have actually increased, and only a 7 percent trimming is proposed for fiscal year 1983. In absolute terms, moreover, the fiscal year 1983 nuclear fission budget is almost 5 times larger than that for all the nonnuclear categories I just mentioned, combined, and I would add that the funding for these categories is considerably overshadowed by the $250 million being discussed to purchase plutonium from the Barnwell plant. Starting the Barnwell plant moreover, will inevitably produce a gross surplus of fuel grade plutonium that will overhang and further depress the uranium industry, where some thousands of miners are already out of work.

Finally with respect to both the Administration's domestic and international plutonium policies, the role of the Bechtel Corporation must be mentioned. Becthel is the designer of the Barnwell plant, has been in the forefront of efforts to gain government backing for the operation of this plant, and is the only U.S. nuclear industry concern to announce publicly an interest in purchasing a share of the Barnwell facility if government support for its operation could be obtained. Internationally, a senior Bechtel official confirmed yesterday to one of my staff members that Bechtel is seeking to gain U.S. government approval to transfer sensitive reprocessing technology to Japan in conjunction with the nation's reprocessing programs. Department of Energy Deputy Secretary Davis was formerly the Vice President for development engineering, planning, and business for the Bechtel Group, Incorporated. In the course of his confirmation Mr. Davis pledged to disqualify himself from participating in a wide variety of matters affecting his former employer. I hope to have a chance to explore how well these disqualification arrangements have been operating.

U.S. STENATE,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
Washington, D.C., August 20, 1982.

The PRESIDENT,
The White House,
Washington, D.C.

DEAR MR. PRESIDENT: I am forwarding with this letter a classified report by the General Accounting Office, based upon an investigation initiated at my request, detailing deficiencies in the security at our nuclear weapons production plants. Although many of these problems stem from the neglect of two prior administrations, inadequacies still exist. Equally disquieting, the GAO concludes that the Department of Energy, in its annual nuclear safeguards reports to you has consistently understated these security deficiencies, even though these have been explicitly detailed in DOE's internal plant security studies.

I have been concerned for over six years about the adequacy of safeguards and physical security at plants making or assembling nuclear weapons or weapons-usable materials or equipment. These concerns were expressed through hearings I chaired during both the Ford and Carter Administrations, and through explicit provisions in the Nuclear Nonproliferation Act of 1978, which I coauthored. Revelations at the aforementioned hearings concerning the possible diversion of nuclear materials from a plant in Pennsylvania, the erroneous declassification of DOE nuclear weapons documents and the fact that a nuclear explosive device could be designed prompted me to go to the White House and discuss with President Carter the urgency of upgrading the protection of nuclear weapons-usable materials and equipment.

In a letter to me, dated June 7, 1978, the then Acting Assistant Secretary for Defense Programs, Dr. Donald Kerr, (now Director of the Los Alamos Laboratory), stated:

"We assume that if a sufficient quantity of strategic nuclear material is stolen or diverted, it could be made into a nuclear device. Therefore, when we design safeguards systems to protect special nuclear materials, it is assumed that if such materials were stolen or diverted, a nuclear device could be designed and fabricated.

"We have stated publicly and to your Committee that given the necessary nuclear materials in sufficient quantities, it is possible for a small group of competent people to design and construct a nuclear explosive."

Virtually all of these deficiencies, I would reiterate, are identified in internal DOE audits whose purport was not communicated to the National Security Council, despite the annual safeguards reporting requirements.

Although it would cost only two percent or so of this year's DOE defense programs budget to remedy the bulk of the defects identified by GAO, for the last six years and longer, funding to upgrade security has not been commensurate with objectives. Indeed, for fiscal year 1983, such funds have been zero'd out altogether.

This situation demands action. In my view, such action should include, but not be limited to the following steps:

1. Direct Secretary Edwards to reprogram fiscal year 1982 funds to deploy low-cost, quicky implemented security improvements at our weapons facilities.

2. Direct Secretary Edwards to appoint a senior DOE official outside the operating arms of the Defense Programs Office, to oversee these and additional long-term security improvement measures.

3. Direct Secretary Edwards to provide you and the Congress with monthly reports on the status of the interim security upgrade.

4. Direct the DOE Inspector General to investigate the cause of any inaccuracies in DOE's annual safeguards reports to the NSC and to make recommendations to Secretary Edwards for any appropriate disciplinary actions.

Finally, in light of the situation described by the GAO, it appears to me that further reflection is needed on the wisdom of the Administration's drive to ease restrictions on the separation and use of plutonium, a weapons-usable material, for civilian purposes. If we are having difficulties in adequately protecting the material at our weapons plants, I fail to see the rationale for increasing the risk of nuclear terrorism by encouraging the use of plutonium before a system of adequate safeguards and physical security is in place.

I urge you to give your personal immediate attention to the matters discussed in this letter.

Sincerely,

JOHN GLENN, *U.S. Senator.*

Enclosure.

ENERGY RESEARCH AND DEVELOPMENT—FISCAL YEAR BUDGET AUTHORITY IN MILLIONS OF DOLLARS (CURRENT)

	Fiscal year 1981			Fiscal year 1982				Fiscal year 1983		
	Appropriations enacted under Carter (1/81)	With proposed, Reagan rescissions (3/81)	As appropriated by Congress (6/81)	As proposed by Carter (1/81)	Reagan first proposal (3/81)	Reagan 12 percent rescissions (9/81)	Actual appropriations (12/81)	As proposed by Reagan (2/82)	Comparison with Carter program 1/81 change	
									Amount	Percent
Conservation [1]	302	212	297	336	88	76	143	18	−284	−94
Solar and renewables [2]	797	625	708	684	241	211	326	83	−714	−90
Fossil [3]	1,111	834	997	1,572	441	374	416	107	−1,004	−90
Energy storage	72	52	72	60	39	34	39	.....	−72	−100
Electric energy systems	40	35	40	39	10	9	21	.....	−40	−100
Magnetic fusion	394	383	394	506	460	404	451	444	+50	+13
Nuclear fission [4]	1,094	1,166	1,077	959	1,247	1,109	1,178	1,016	−78	−7
Related programs										
Energy conservation grants [5]	515	346	412	586	107	94	240	4	−511	−99
Solar and energy conservation bank	121	0	0	50	0	0	[6] 23	0	−121	−100

[1] Conservation includes: Buildings and Community Systems, Industrial Energy Conservation, Transportation, Residential/Commercial Retrofit, and Multi-Sector.

[2] Solar and Renewables include: Active and Passive Heating and Cooling, Photovoltaic Energy Systems, Solar Thermal Energy Systems, Biomass Energy Systems, Wind Energy Systems, Ocean Energy Systems, Solar Energy Research Institute, Alcohol Fuels, Hydropower, and Geothermal Energy.

[3] Fossil includes: Coal—Mining Research and Development, Coal Liquefaction, Surface Coal Gasification, In-Situ Gasification, Advanced Research and Technology Development, Advanced Environmental Control Technology, Heat Engines and Heat Recovery, Combustion Systems, Fuel Cells, and Magnetohydrodynamics; Petroleum—Enhanced Oil Recovery, Oil Shale Drilling and Offshore Technology, Advance Process Technology; Gas—Enhanced Gas Recovery; and Fossil Fuel Applications.

[4] Nuclear Fission includes: Commercial Nuclear Waste, Nuclear Waste Disposal Fund, Advanced Nuclear Systems, Converter Reactor Systems, Nuclear Fuel Cycle, Breeder Reactor Systems, Advanced Isotope Separation, Uranium Resource Assessment, and Remedial Action. Funding for Clinch River Breeder Reactor included in all columns except Carter fiscal year 1982 proposal.

[5] Energy Conservation Grants include: State and Local programs (such as energy conservation retrofit for school and hospital buildings and low-income weatherization), and Energy Impact Assistance (designed to assist communities adversely impacted by rapid increases in employment resulting from the development of energy resources).

[6] "Impounded" by Reagan.

Sources: DOE budget requests for fiscal years 1981, 1982, 1983, and actual appropriations for fiscal year 1981 and fiscal year 1982.

[Brief recess.]

Senator PERCY. Secretary Davis.

TESTIMONY OF W. KENNETH DAVIS, DEPUTY SECRETARY OF ENERGY, DEPARTMENT OF ENERGY, WASHINGTON, D.C.

Mr. DAVIS. I would like to start by saying I am pleased to have this opportunity to appear before the subcommittee to discuss, along with Secretary Kennedy, the recent development in the administration's nonproliferation policies and the role of reprocessing and plutonium in advanced nuclear power programs.

I would also like to say I share your convictions about the importance of nonproliferation and further say that I do believe that the programs that we are proposing to try to establish will in fact improve the nonproliferation regime and will be a step forward and not, as some claim, a step backward. I think we will in fact have a stronger approach to nonproliferation.

In the process of my comments, I will try to respond to the various points raised in your letter of July 30, 1982. You requested that I comment on a number of specific questions relating to reprocessing, including operating experience, economic viability, and safeguardability of facilities. You also requested my comments on the relationship of the administration's position on reprocessing and plutonium use to certain requirements in the Nuclear Non-Proliferation Act and on the desirability of congressional consideration of legislation prohibiting the export of sensitive nuclear technology, including reprocessing.

In examining recent policy developments, it is important to do so from the perspective of longstanding U.S. nonproliferation objectives.

Since the end of World War II, seeking to avoid the spread of nuclear weapons has been a major and continuous element of U.S. foreign policy that has received the strong support of the public, the Congress and an unbroken succession of administrations. The Reagan administration is as firmly committed to attaining the objectives of this policy as any of its predecessors.

We also recognize nuclear power has an important role to play. We likewise believe it would be highly unrealistic and imprudent for a variety of reasons to rely on coal as the sole primary electrical energy source of the future.

Within the United States, we foresee that nuclear power will satisfy about 25 percent of America's needs for electricity by the early 1990s. Other countries are also projecting substantial increases in the energy contributions from their nuclear programs, notwithstanding the current slump in the global economy. France, for example, is likely to fill 68 percent of its electricity demands through nuclear by 1990, and Japan plans to supply 22 percent of its electric power requirements from nuclear powerplants by the year 1990.

The United States has had a leading role in fostering the peaceful uses of nuclear energy for years. However, during the previous administration, U.S. policies were interpreted as antagonistic to nuclear power. In particular, the U.S. position on the role of the breeder and reprocessing in the planned commercial nuclear power

programs of some of our close friends and allies was viewed with distrust.

This administration has been endeavoring to remove unnecessary regulations and restrictions and restore momentum to the U.S. domestic program and to engender trust and predictability in our nuclear relationships with cooperating nations.

In my view, we are doing this in ways that accord high priority to, and will promote, our nonproliferation objectives. Indeed, I am convinced that our general effectiveness in the nonproliferation field will depend on maintaining our current course. The changes made in our export policies in 1977–78 led to serious tensions and diminished the confidence of others in the United States as a stable and reliable partner.

Domestically, we are trying to introduce greater efficiency in the process of licensing light water reactors. In addition, the breeder reactor has great potential for extending the uranium resource base. We are seeking to restore our comparative technological lead in this field through completion of the Clinch River breeder reactor. Also, since it is crucial that the utility industry see a clear, consistent Government policy for closure of the back end of the fuel cycle, we are aggressively pursuing establishment of a waste disposal system—with strong congressional support on a waste management bill—and we have removed the ban on commercial reprocessing that was imposed by the last administration.

Internationally, we are seeking to resolve nuclear fuel cycle issues with some of our closest allies to enhance both our nuclear cooperation and nonproliferation objectives. To this end, we are offering new long-term understandings with Japan and Euratom on implementation of consent rights as they apply to their reprocessing and plutonium use programs.

In Japan and Eratom countries with advanced nuclear programs which do not pose any proliferation threat, we are convinced that the U.S. interest will best be served by granting them longer term programmatic approvals. This is based on achieving satisfactory mutual understandings with these nations on enhancing international cooperation to improve the nonproliferation regime and safeguards.

Any new programmatic consent must meet our statutory requirements and will be granted only within the context of arrangements and procedures in the Atomic Energy Act and will be subject to appropriate congressional review.

By taking these domestic and international actions, I believe the United States can reassert its leadership in international nuclear affairs and thereby enhance its global influence in the field.

It becomes more difficult to influence the course of other nations' programs if our domestic nuclear power program lacks momentum and clear direction. We cannot assure that the breeder and reprocessing programs of Japan and Euratom are shaped to facilitate the application of effective controls unless we, ourselves, are active in these areas. Having said this, it is important to underscore that the administration clearly understands that the breeder and reprocessing activities as well as the use of plutonium must be effectively controlled.

Accordingly, we strongly believe that stringent safeguards will have to apply to these activities, and, as the President has stated, we will continue to oppose the spread of sensitive technologies and materials, particularly in unstable regions or where there is a proliferation risk.

The technology of reprocessing is approximately four decades old and has been basically unclassified since the late 1950's. It is judged by the French, the Japanese, the British, and the Germans to be important to their ongoing civil nuclear power programs. Japan and the Euratom countries that favor reprocessing in their nuclear power programs do so for several reasons. First, they regard reprocessing as essential for making full use of the nuclear fuel available to them, especially to allow development of the breeder which many of our closest friends consider vital for their energy future.

Second, they believe it is an important and useful way to prevent spent fuel from accumulating beyond the capacity of the spent fuel storage pools at reactor sites. Third, they believe that it provides major waste disposal benefits by reducing the volume of high-level waste and producing a waste form especially engineered for disposal.

It is generally recognized that reprocessing plants must be large to be economically viable. A 1,500 metric ton breeder plant will serve the needs of about 50 reactors.

Many nations do not wish to acquire their own reprocessing services offered by a few large countries, such as the United Kingdom and France. For nonproliferation reasons, we have a clear interest in limiting the number of such facilities around the world, and thus have favored the idea of exploring the possibility of structuring new plants on a multinational basis or under terms of providing services to others.

A key element of this administration's nonproliferation policy is recognition that we should tailor our attitudes toward country-specific situations.

Thus, the administration neither categorically supports nor condemns reprocessing and plutonium use for all countries. Neither do we visualize authorizing the transfer of reprocessing technologies beyond Japan or Euratom. To the contrary. While there may be some cases where reprocessing projects in these countries will be in the U.S. interest, these will be approved only when we are convinced they are supportive to our nonproliferation objectives and if the required statutory determinations are met.

Mr. Chairman, the balance of my prepared testimony responds to your specific questions which we raised in your letter. I believe it might be better, rather than go through in detail, if I submit the rest of my statement for the record and then we can respond to the questions which are of the most interest to you and your committee. I will be happy to do it either way.

Senator PERCY. Thank you very much, Mr. Secretary. We appreciate your testimony, and particularly we appreciate the response that both of you gave to some of the questions that we raised when we first invited you to appear.

Secretary Kennedy, in your statement you indicated the United States no longer enjoys the position as a monopoly supplier of nu-

clear materials equipment and technology. Today we supply only 35 percent of the non-Communist enrichment market whereas we accounted for virtually all of it just a few years ago. In that period of time when we had a monopoly and had quite a considerable amount of clout, how have we changed our policy? Have we changed it as a result of having less influence with purchasing countries or what?

Mr. KENNEDY. Senator, I think the policy in respect to various countries has naturally had to reflect the realities of the time and the situations in which we were trying to deal with them.

It is obviously a lot easier to bring to bear influence if in fact you are the only influencing factor in the situation. So it was for a very long time. Indeed I suspect for the better part of 20 years the United States in the Western world was the only important factor in nuclear commerce and our influence, therefore, was strongly felt.

I would have to say in looking back over the history of those years, many of the issues which we now see as being paramount in the whole safeguards regime question and the nonproliferation regime we are talking about today, many of those things were not recognized as being of perhaps the order of significance, severity we now ascribe to them properly. I think that is natural. I do not intend that as a criticism of the past at all. I think history has helped us learn a good deal more about what the dangers are and how to deal with them. The problem now, as we know about the problem that we are dealing with, know more about the specific things that ought to be done, our ability to bring them about in a unilateral sense, is a good deal less than it once was.

Senator PERCY. By the way, let's go on a 10-minute rule, if we can start the clock. I already had a minute or two.

Secretary Davis.

Mr. DAVIS. Mr. Chairman, I would like to make a comment relative to that, too.

I don't think this was implied by Secretary Kennedy, but I do want to make very clear that we are not taking the position that the decrease in the sales of U.S. equipment, services and materials abroad has come about because of our policies. We have gone through a period where competition has increased worldwide in almost every nuclear area. This itself has, I think, decreased our leadership and our influence. What we have seen is that some of the policies and some of the actions that have been taken have further accelerated this and, although I think it would be very difficult to quantify exactly where we might have been if certain things had not happened. It is a matter of degree, and not an absolute.

What we are arguing is that we ought to maintain the maximum influence we can by the actions that we take and not give up any further influence by jeopardizing our ability to participate in the worldwide regime.

Senator PERCY. A provocative question I would like to put to both of you, looking back a little bit. The United States uses reprocessing technology to separate plutonium for nuclear weapons. Under Presidents Ford and Carter the Government tried very hard to limit the spread of that technology.

Has the Reagan administration actually given up the effort to stop the spread of reprocessing technology?

Mr. KENNEDY. Not at all, sir. What is recognized, it is very difficult to stop the spread of technology to a country which already has it. We are simply trying to deal with the world as it is and to maximize the effects of our policy aiming at an agreed set of nonproliferation goals and objectives with countries which are already pursuing these programs, already have this technology, not trying to keep them from what they now have.

In no sense are we loosening up in the sense of projecting this technology to other countries where there may be a risk of proliferation or where there is no ongoing program which would in any sense justify that kind of technology.

Senator PERCY. Mr. Davis, if you could answer the same question and add to it whether the perception that the plutonium policy of the administration amounts to a de facto endorsement of reprocessing and commercial use of plutonium. Is this true?

Mr. DAVIS. First of all, let me comment on the technology. The technology in most of its detail has been widely available on a published basis around the world for approximately 40 years. So, we are not really talking about anything that is magical about it. There is equipment that can facilitate it, which is available in many places in the world, and there is certain experience that is related to reprocessing plants.

Insofar as the revised policy is concerned, we are not changing the procedures for granting licenses for export of technology or assistance in any way. This is not proposed to be changed and in fact we will be publishing shortly a revision to 10 CFR Part 810, which will increase the list of countries which are not on the general authorization list. This means that those countries will have to come back to the Department for authorization, in any case for information which is already under general authorization, but we will not in any way change the prohibition against reprocessing technology.

As far as the endorsement of reprocessing and use of plutonium, I think we have to bear in mind that the Japanese are doing reprocessing, the Western Europeans are doing reprocessing. We are not setting them off any track they are not already on. They are interested in reprocessing for perfectly sound reasons from the point of view of economics and technology, and I do not think we are affecting that at all.

Senator PERCY. When Senator Glenn and I drafted the Nonproliferation Act, we knew that an all-out effort would have to be made to provide alternatives to commercial reprocessing, but we felt it vital to do everything possible to steer away from major international traffic in plutonium. The act calls for several important initiatives that were supposed to help. We always preceded our discussion of the act by saying these are untried areas. We are just trying them out and we are subject to change if they don't work. But the act does call for—in section 104, for instance, it urges the President to negotiate with other governments to establish both an international nuclear fuel authority to provide fuel services and repositories for spent nuclear reactor fuels that would be under international control and inspections.

What actually happened to these proposals? Have we abandoned them?

Mr. KENNEDY. Not all, Senator. As a matter of fact, the spent fuels proposals and plutonium storage proposals are under continuing study. These are very complex kinds of problems, obviously in an international sense, trying to get a consensus among a large number of countries which would in effect call for some measure of giving up of controls of materials which they believe to be their own. But these are actively under study, programs with the IAEA, trying to determine ways in which this might be effected.

I wish they could move more rapidly than they have.

Senator PERCY. Just to finish up, then, my last question on the general topic of what we are getting in return. The plutonium use policy implies that the United States is prepared to give up some of the consent rights it has over United States-supplied nuclear fuel. I regard that as a major concession. What do we expect to obtain in return and what about insisting on a commitment that full scope safeguards be a condition for all future nuclear exports?

Mr. KENNDEY. Let me say on that, Senator, without breaching the confidentiality of a great many ongoing discussions and negotiations, I can tell you in a public session that we are actively pursuing precisely that as our objective, an objective, the kind of objective I refer to in my opening remarks, which we would hope would be a mutually shared objective.

We are trying to persuade all of those whom we recognize as our nuclear trading partners, our allies, trying to persuade them that this is the only way in which a sensible nonproliferation regime can long survive.

While I cannot lay out a series of guarantees at this juncture, I can only say with continuing pressure, which I can assure you is being brought to bear, continuing persuasive efforts in negotiations, we are increasingly confident that we are moving in the direction you seek.

Senator PERCY. Thank you.

Mr. DAVIS. I believe, as you pointed out in your testimony, Mr. Kennedy, that we are in effect seeking some consent rights we do not now have. So, we are not giving them up, we are in fact likely to end up with greater control, not less. What we will be giving up with a longer term approach is a case-by-case agreement.

Mr. KENNDEY. Let me add to that, too, there is perhaps some misunderstanding in the case-by-case question. Obviously if one establishes a long-term agreement, long-term understanding, that understanding is predicated on a number of specific agreed principles and any agreement has to be a living document, it has to be reviewed against what is going on at the time and each time a particular question arises in terms of exports, for example, or movement of material, it is looked at against the understandings that were reached in that agreement.

If the understandings seem to have been in some way violated, if that is the word, or shaded somehow, then one considers that as he looks at the particular case. It is not just a blanket agreement, no matter what, for 30 years to go ahead and move material.

Senator PERCY. Senator Glenn?

Senator GLENN. Gentlemen, why do we need the breeder and reprocessing now? Why do we need new plutonium production?

Mr. DAVIS. Our prospective need for plutonium, which is some years off, has to be arranged sometime in the near future. We need a substantial amount to continue in operation our principal research facility, that Fast Flux Test facility at Hanford, and for some of the other experimental facilities, and we will need a substantial amount of plutonium for the Clinch River breeder as it continues to operate.

What we are contemplating is the possibility of entering into contracts for plutonium, but the plutonium itself would not be delieverd for many years.

Senator GLENN. Correct me if I'm wrong, but I don't see how the plutonium is going to be used because my understanding is that Barnwell will produce between 12 to 15 tons of this material per year, and that we only have a need for 1 or 2 tons per year for the U.S. breeder program. I understand that currently we have adequate plutonium to fuel all the upcoming breeder R&D that we have scheduled right now.

What are we going to do with the output of Barnwell?

Mr. KENNEDY. We do not have the plutonium needed for Clinch River, we do not have the plutonium needed for the follow-on fuel for FFTF.

Senator GLENN. Why are we going ahead with Clinch River; that is a good question.

Mr. DAVIS. That is a good separate subject.

Senator GLENN. But it is a good one. The experts I have talked to in the field say it embodies old technology, if we are going ahead with the breeder program it should be something different than the Clinch River.

Mr. DAVIS. I disagree with that completely. I am fairly familiar with the development of the breeder technology, having been involved for a period of over 30 years. I think I am reasonably familiar with the technology embodied in Clinch River. I would like to hear what is it about it that is so old-fashioned and so absolete. There are only two issues that I know of that would in any way indicate that. One of them is that CRBR a different type of breeder than is being designed by the French and the British, but the same technology is involved. Second, CRBR is relatively small compared to some of the ones that are now being planned, but are not yet in operation. Otherwise, it is a very modern machine, it has one of the most modern designs of cores in the world and the technology that is embodied and the equipment that will be in it is up to date.

Senator GLENN. What is the relationship between Barnwell and Clinch River? Is the Department's view that the Clinch River reactor shouldn't be built unless the Barnwell facility is also built?

Mr. DAVIS. The Barnwell facility has already been built by private industry.

Senator GLENN. Does one depend on the other?

Mr. DAVIS. Only in the sense that we will need to acquire the reactor-grade plutonium needed for Clinch River somewhere.

Senator GLENN. Do we not now have enough plutonium stockpiled now to run Clinch River if it is built?

Mr. DAVIS. No, sir. Not earmarked for Clinch River.

Senator GLENN. How much is required to fuel Clinch River?

Mr. DAVIS. Over a period of some years, I will have to get the exact number.

Senator GLENN. Is the figure that Barnwell will produce 12 to 15 tons a year; is that correct?

Mr. DAVIS. Barnwell at full operation probably would produce something in the order of 10 tons a year, not 15.

Senator GLENN. How much will Clinch River use?

Mr. DAVIS. Over the period we are looking at, to the year 2000, about 15 tons.

Senator GLENN. Fifteen tons between now and——

Mr. DAVIS. FFTF about 8 tons. We foresee a requirement in total of perhaps 20 to 25 tons.

Senator GLENN. Two years' output of Barnwell would take care of all of our needs up to the year 2000; is that correct?

Mr. DAVIS. Barnwell would take care of all our needs once it started, but bear in mind it won't be in operation for a considerable number of years yet. We are not talking about operation, immediately but between 1988 and the year 2000, and it would not allow for stockpiling plutonium to fuel any of the first generation of operating breeder reactors. That fuel would have to come from somewhere and it would take a considerable number of years to accumlate it. There are no such plans to build such reactors at the present time, but when they are built, they are going to require large amounts of plutonium.

Senator GLENN. I still don't see the advantages of going ahead with these and permitting others around the world, with our help, in fact, our full cooperation, to go into plutonium production. What are the advantages of this? I know the arguments about cutting down the amounts of high-level waste, but we also have seen a number of studies that show that the additional equipment used in reprocessing and plutonium fuel fabrication will probably increase the total amount of radioactive material that has to be disposed of so that you come out with a wash as far as the overall amount of high-level and transuramic radioactive waste needing permanent disposal. Moreover, we have adequate uranium supplies worldwide for an indefinite period. So, why do we need to go to the plutonium economy around the world now?

Mr. KENNEDY. Senator, may I comment? You are correct, given the present demand, there is a substantial quantity of uranium and uranium is relatively cheap and thus one might argue that the economics at this point are not in favor of moving to breeder production, and thus would argue as well for not proceeding at this juncture with reprocessing.

On the other hand, what one has to look at is not necessarily today's situation alone, nor this country's view. The countries of Europe and Japan in particular, where this activity is actually ongoing, it is not a question of whether they undertake it, they are undertaking it. They are already involved in doing it, have been for some considerable period of time. They are looking toward their long-term concerns in the future, and the total need for energy.

They, therefore, are moving ahead. They are doing it whether we think the economics would make sense or not. Thus, it seems to us that so long as this is going on, our advantage lies in working with

them so that we can actually incorporate in the systems that theya re building the most advanced safeguards technologies that we can possibly work together to develop.

In other words, what we are doing is recognizing an ongoing program, one that we have been unable for a variety of reasons to contain, it is a program they are developing, which they are moving forward with.

Our objective is a safeguards and nonproliferation regime that will properly protect those kinds of installations; participating with them in developing those kinds of safeguards technologies makes our participation in our view a sensible course.

Senator GLENN. My time is up but I would just say, Gordon Chapman, head of the Clinch project, and Kermit Lawton, head of Barnwell, told my staff explicitly Barnwell is not needed for Clinch River and adequate plutonium is available.

Were they wrong?

Mr. DAVIS. We do not know exactly where we will get the plutonium for Clinch River and some of the follow-on activities. We could get it from our military resources, but that doesn't seem to be a very good prospect if we are to meet our current weapons stockpile memorandum requirements.

Senator GLENN. My time is up, Mr. Chairman. I will have some additional questions.

Senator PERCY. Thank you.

Senator Cohen?

Senator COHEN. Mr. Davis, are any of our allies trading with any of the 63 countries who would be subject to the nuclear export restrictions that were discussed in today's Washington Post?

Mr. DAVIS. Are any of our allies trading with them?

Senator COHEN. Are they exporting nuclear technology to any of those 63 on the list?

Mr. DAVIS. Yes; I believe so.

Senator COHEN. Which countries?

Mr. DAVIS. Pardon

Senator COHEN. Are ally countries trading with those countries that we feel are unreliable in terms of developing their own nuclear reactors?

Mr. DAVIS. The countries that are on the list are not there because they are unreliable. They are on the list because they don't meet the present criteria and they don't have a general authorization. This means in order for us to trade with them they would have to come to us and get a specific authorization. We would then have to examine it on its merits and in accordance with the criteria.

We are not prepared to release the new list until it is published in the Federal Register.

Senator COHEN. Would you say that Libya and Syria are stable enough to have this technology? Isn't that why you put them on the list, because they are not stable enough?

Mr. DAVIS. We put them on the list because we felt before any technologies were given to them it ought to be considered and a judgment made?

Senator COHEN. Do our allies have similar lists of restrictions?

Mr. DAVIS. Our allies don't have any one particular system. We are trying to get them to adhere to much of the same criteria that we are. Some of them are trading now with some of these countries, as we are.

Senator COHEN. You mentioned before that Japan is heavily engaged in reprocessing for sound economic and domestic reasons, and I am sure there are sound economic and domestic reasons for their policy. I recall, however, recently a stir was created when the Japanese people were engaged in a rather widely publicized memorial service commemorating Nagasaki and Hiroshima. They were quite upset with the ill-timed explosion carried out by the United States at that time.

I would say the timing was not only unfortunate, but indeed a reflection of the lack of sensitivity on this Government's part.

The fact of the matter is that there was a great deal of hypocrisy on the part of Japan. If Japan is engaging in the sale and export of the technology with other countries, it seems to me the country should not complain.

It reminds me of a parallel where Japan has supplied the Soviet Union with one of the largest drydock communities in the world and then they expect the United States to help defend the Japanese territory.

I find it somewhat hypocritical on the part of these countries who seem engaged in sound economic policy for exporting these kinds of technologies. I don't, however, find that a satisfactory rationale for us to leap in it with the logic expressed to date that we can become a reliable supplier. I don't understand how we control the spread of nuclear weapons by becoming a sort of a partner in a loose federation of these nuclear exporting countries.

Mr. KENNEDY. May I comment very briefly without making a policy for any particular country and say that we are pursuing very, very strenuously with every country who conducts nuclear commerce breaks on such commerce with countries such as those where instability actually rises.

The kinds of countries to which we would not export, that is not that full list of 63. Many of those we do export nonsensitive materials to, but only after a careful case-by-case examination to determine the nature of the material itself. But there are some to which we would send nothing and in those cases we are making every effort with every country and with considerable success.

We are pointing out the dangers of these things, the success rate is very high Let me add there that Japan is one of the countries with which cooperation in this regard is a very high level.

Senator COHEN. What sort of cooperation do we achieve by entering in the export business ourselves? How do we achieve cooperation from Japan?

I recall quite a stir was created when the Carter administration came out against West Germany transferring nuclear technology to Brazil, I recall the German reaction was principally based upon a feeling that it was hyprocritical on the part of the United States to try to restrict their sale of nuclear technology to Brazil so we can achieve it ourselves. They were bitter and resentful for a considerable period of time.

How are those fears overcome when we are trying to restrict export technology to other countries?

Mr. KENNEDY. Precisely because we try to restrict the countries where we couldn't export.

Senator COHEN. That is why I asked the question initially.

Are you going to get the other countries to put the same restrictions that we would put on these 63 countries that you have listed? Are they going to agree to that?

Mr. KENNEDY. If I may, as to the 63 countries, many of those we do export nonsensitive materials or equipment to. It is only a question in some of these cases of getting a distinct case-by-case approval, rather than a generic one.

Senator COHEN. Do other countries have a similar restrictive policy?

Mr. KENNEDY. Many do, not necessarily with respect to precisely the same list of countries, but where there are genuinely sensitive countries, countries where we believe the situation is such that we would not wish to export at all under any circumstances, or where we believe there is a proliferation risk, where we believe that there may in fact be a serious question, a serious problem somewhere down the road, we do go to the exporting countries and make the strongest representations.

As I say, the success level in respect to these is pretty high. As I mentioned much earlier, we are getting closer, I think to the objective which we have would be a universal application of the criterion of full scope safeguards.

Senator COHEN. Were we successful with Germany with respect to the Brazil situation?

Mr. KENNEDY. That was 4 years ago. We were not.

Senator COHEN. They looked at it clearly from an economic point of view.

Mr. KENNEDY. But since then there has been a tightening and an increasing concern expressed on the part of the German Government.

Senator COHEN. In that article in today's paper, there was a question raised about whether or not a foreign subsidiary—there is a parallel between the pipeline situation where foreign subsidiaries of American corporations are selling equipment to the Soviet Union—as to whether or not a foreign subsidiary of a domestic company could sell this technology to one of the countries on the list and this country has no control over that.

Do you recall reading that? The answer was: Under the present regulations they could but under proposed regulations, they would have to get approval of the Department of Energy. I find that ironic since this administration is going to abolish the Department of Energy.

Mr. KENNEDY. The regulations won't be abolished. They are always the last to go. The regulations will be administered.

Senator COHEN. Are they able to survive the abolition and demise of DOE?

Mr. KENNEDY. They will be moved to some other ministerial activity.

Senator COHEN. They will go to the Department of Commerce.

Mr. KENNEDY. They will either go to the Department of Commerce or some element of a successor of the Department of Energy.

Mr. DAVIS. May I comment, because we have no way to compel other countries to adhere to the same standards that we have set.

What we are trying to do is establish standards that we think are reasonable and, through persuasion and negotiation with other supplier countries, get them to agree to something similar to what we are doing.

As Secretary Kennedy has said, we have in the last 2 or 3 years had good success in doing that. I think you have to keep in mind we have probably the most restrictive regulations of any country and the part of our——

Senator COHEN. Don't you think that we should?

Mr. DAVIS. I don't see any reason why we shouldn't, providing we can achieve something useful by having them.

What we have to do, if we are going to have them, is be willing to participate in activities overseas with those with whom we have confidence in order to try to get them to agree to what we are doing. This gives us a chance to help participate. For example, this gives us ability to influence what has already been set, what is done by way of safeguards and security relative to reprocessing plants in other countries depends on whether or not we are a party to that particular situation.

Senator COHEN. In other words, we have to be a player in the export game in order to be in a position to influence other countries.

Mr. DAVIS. That is absolutely correct, yes, sir.

Senator COHEN. That is all.

Mr. KENNEDY. Having said that, Senator, that does not necessarily imply that we need to bend our rules, it simply means tht we couldn't opt out of the game altogether.

Senator COHEN. What I want to know is to what degree are we going to make the effort to have the other countries come to our more stringent regulations rather than opting into the federation, reducing our own restrictions even further?

Mr. KENNEDY. We are fully mindful of that concern. Indeed, as I mentioned, we are engaged in a continuing effort, both discussion, persuasion and negotiation, with all of the suppliers looking toward a regime which would be uniform both as to criteria and in effect and we would hope that could be based on a concept of full scope safeguards.

Senator COHEN. My time is up, Mr. Chairman.

Senator PERCY. Senator Cohen, I have to leave in about 15 minutes to host a meeting with the speaker of the Knesset. Would you be able to stay and chair the hearing?

Senator COHEN. Yes.

Senator PERCY. Thank you.

Any questions that I do not get finished, I will submit for the record. I appreciate you response to them.

If I could get back to the agreements on plutonium use, I understand the Department of State has taken the position in any agreements on plutonium use must take the form of negotiated agreements for cooperation, that must then come before the Congress for approval.

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Is this a correct statement of the Department's position?

Mr. KENNEDY. Let me say that without reference to what they may be called, the fact is that we will treat them in that way and they will come before the Congress.

Senator PERCY. I strongly support that. I don't think the Congress should be circumvented, and you have no intention of doing that.

Mr. KENNEDY. No intention at all.

Senator PERCY. Secretary Kennedy, in my letter of invitation to you I asked that you address the question of the amounts of plutonium that would be subject to reprocessing under the new policy.

Could you tell us as precisely as possible how much plutonium might be separated under such renegotiated agreements, assuming the United States reaches agreement with Japan and Euratom?

Can you give us a rough estimate?

Mr. KENNEDY. I couldn't give you an estimate but I will introduce one for the record.

[The information referred to has been retained in the subcommittee files.]

Senator PERCY. It will probably run in the thousands of kilograms.

Mr. KENNEDY. Actually it depends over what period we are talking about, Senator.

Senator PERCY. And the outcome of the negotiations.

Mr. KENNEDY. Many, many kilograms. If in fact we have specific results and if we were talking about a very long period. But right now the whole question is obviously under discussion and we have not completed those discussions.

Senator PERCY. If there is any information you can supply for the record, we will keep the record open for that purpose.

I think we all agree that neither Japan nor the EURATOM countries are proliferation risks but we are talking about a very large volume of material.

Would it be technologically possible to manufacture nuclear explosives from this material?

Mr. DAVIS. It is certainly possible to make nuclear explosives from reactor grade plutonium. That is not a good or even desirable source, but it is possible.

Senator PERCY. I know you have had some discussions with the Government of Japan. As you understand it, what do they intend to do with their plutonium?

Mr. KENNEDY. By and large, Senator, I think they would visualize continuing to send it to Europe for reprocessing. And some of it they would undoubtedly wish to use a small quantity in addition with some of their research and development work ongoing.

Mr. DAVIS. They have a breeder program.

Mr. KENNEDY. And some gone into the breeder program that is underway.

Senator PERCY. It is quite clear that the plutonium use policy will mean discrimination among our nuclear trading partners. For instance, providing a long-term programmatic approval for Japanese facilities could well lead to request for similar approvals from other countries in the region.

Is the administration prepared to say "no" to such requests?

Mr. KENNEDY. We are prepared to say "no," yes, sir.

Senator PERCY. Won't refusing such requests lead to the same sort of diplomatic tension the United States had hoped to reduce with this policy?

Mr. KENNEDY. No, sir, we do not think so. It has been made perfectly clear that this policy contemplates approvals of this kind only in circumstances where advanced nuclear programs are actually in process or underway and there is in fact a need for such programs.

We are making an effort to discourage the development of the programs themselves which might in turn generate requests for this kind of program.

Senator PERCY. Secretary Davis, based on the part of your own testimony, I would like to ask you about the Clinch River breeder reactor.

Over the past few years, arguments have been made against the Clinch River breeder reactor on nonproliferation grounds: As currently designed, the reactor would breed the elements of plutonium which in addition to being used as a reactor fuel can be used in the manufacture of nuclear weapons and bombs. Yet, in your statement, you appear to be making the opposite point that this type of breeder technology will actually promote nonproliferation.

There seems to be some contrasts here and conflict. I had not heard that point of view expressed before.

Is this really what you mean?

Mr. DAVIS. I think there are several ways to look at it.

One of them is that we do feel that it would give us an opportunity to develop the techniques, the safeguarding types of operation, measurement techniques and so forth that would lead to better safeguarding of breeder reactors so that in that particular sense it is certainly my conviction that the opportunity to develop these and to try them out on a reactor such as Clinch River would be a step forward in developing the necessary safeguards techniques that are going to be needed in the nuclear reactor whether in this country or overseas.

Senator PERCY. The last area that I would like to get into is the national security implication of further proliferation. I am certain that Senator Glenn remembers, I am not sure Senator Cohen was in the committee.

I remember Mr. Lilienthal was sitting where you are sitting now saying he was glad he is as old as he is, he wouldn't want to be the age of his children and his grandchildren, the world is becoming too dangerous.

Both of you are knowledgeable in the area of future security implications of proliferation.

Based on your experience and what you know today, could you give us your own candid personal opinion, what is the likelihood in the next 10 to 15 years, we will see unstable governments acquire nuclear weapons and possibly use them?

Mr. KENNEDY. Senator, it would be foolish to say that such a thing would be impossible; we are past that by a great many years. It is no longer impossible.

But by the same token that need not be interpreted as saying it is inevitable; I do not think it is. I think that it is difficult to attempt, as we are attempting, to foreclose further nuclear develop-

ment, nuclear weapons development. But I think it is absolutely essential that we keep trying.

There is no, in our judgment—it is worth noting the other day when Secretary Schultz was on one of the Sunday talk shows, I don't remember which one, he was on and said when asked what he thought some of the most important problems into the future would be which needed urgent attention, he said the problem of arms control as a general proposition and the problem of potential continued proliferation.

Nonproliferation issues were very high on his agenda.

So they are. What we need to do is continue doing much of what we have been doing but we need to find new, if we can, new approaches to things like sanctions, what they are and how they can be used is really not clear. We are beginning to put more attention on that.

The whole world order obviously is at issue and we are going to have to see how that can be used to influence Government's thinking—unstable governments are pretty hard to influence. But when a government begins to think for whatever reason that its own security is somehow enhanced by acquiring nuclear weapons, it is obviously not thinking straight and we need to get that point across to the extent that we can, also see if there aren't ways that we can mitigate the effects of this instability.

Senator PERCY. Is it not true that the Soviet Union is careful in its sharing of its nuclear technology? They did it once with China—to the best of my knowledge, every single weapon they helped them build is aimed right at them, every one of them, and they must dread and regret the day they ever got into sharing that technology with the People's Republic of China.

When I first ran for the Senate I remember saying one of the reasons I was leaving the private sector is my deathly fear of what we were getting into. I couldn't do anything about it back there. The paramount issue of our time is nuclear weaponry.

One of my greatest satisfactions in coming here, is that I have stirred myself into every single committee and subcommittee I could dealing with this issue and have stayed with it for years.

Even with the two fine colleagues I have on both of my sides, Senator Glenn and Senator Cohen, who have shared that deep concern and who have devoted themselves in every conceivable way, we feel grossly inadequate for the scope of what we are up against. But the implications of what you have just commented on are very great indeed. The introduction of nuclear weapons into unstable areas could really mean an enormous increase of the destructive potential of a regional conflict.

Imagine what would have happened if the situation in Lebanon had gotten worse than it was. We don't always have a Phil Habib that can jump into the breach. It could involve the superpowers and that is what causes deep concern on the part of the United States and the Soviet Union—we both understand and know the power of these weapons and both want to stop the proliferation of them.

This is why the President is really going to a program to not just freeze but reduce by a third to start with and then literally move toward the reduction of every single nuclear weapon. That is his

program and that is the essence of the resolution we have reported out of the Foreign Relations Committee.

Senator PERCY. It could fundamentally affect the relations between the United States and its allies. The threat to U.S. national security can be much more direct than most people realize.

The very least is nuclear terrorism, something we may someday have to worry about. Our strategy for coping with the threat of nuclear weapons must look beyond the kinds of issues we have discussed today.

The controls in the Nonproliferation Act and other legislation are an essential part of this strategy. For national security reasons we should be carefully examining our alternatives in case those controls fail.

I want to put these requests to the two of you because you are the most knowledgeable people in the Federal Government. There is a tremendous amount of cynicism and concern in the general public, in the American public and the world public, in Europe, where they are particularly concerned that Government is not doing enough, and I want to give you the chance to evidence your own concern that you have privately expressed to us but to say publicly now, what is Department of State, what is the Department of Energy and other agencies doing to consider these measures that we have been talking about, to prepare ourselves today if the time ever does come when nuclear weapons are more widely held? How do we handle this problem, and how much thought and time and energy and effort are you personally, and as the Reagan administration, putting into this particular problem which really transcends, when you look at the long term, all other problems, every other single problem we will be coping with and dealing with.

Mr. DAVIS. Well, Mr. Chairman, I think you have stated the problem extremely accurately and I would have to say that I personally, as well as my associates, are deeply concerned about this.

We have been trying to undertake initiatives trying to ascertain how we might better be able to deal with the present situation, what kinds of things we can do to try to strengthen the present system.

Secretary Kennedy mentioned sanctions. We have been looking at what the possibilities might be there. I think we recognize that the overall internationl system is going to be strengthened. At the same time I think we recognize very clearly that, as one country, the United States cannot dictate to the rest of the world what is going to be done. We do hope we can find a way to provide some leadership.

It is a very complicated question, and when you were discussing some of the things, it certainly seemed to me that we have a lot of choices.

We have been discussing some of the things that we have elected to do today. These are not perfect solutions.

What we are trying to do is to see if we do this, what is the consequence; if we do something different, what does that alternative produce by way of a world situation?

One may not look very good; the other may look worse. So we are trying to go through this with our associates from the Department of State and the other departments; we are trying to see

what the best way is the United States can try to influence what is being done in the world and really strengthen the system, recognizing we are pushing on it and that we do not have control over all of it.

That is exactly the exercise on which I have spent a lot of my time, and other people are spending a lot of their time on. We are concerned about it and I can assure you we are going to do the best we can to try to figure out what the best solution is.

Mr. KENNEDY. If I may add a couple of thoughts.

I subscribe to everything Secretary Davis has said. Indeed, we and our colleagues in other departments are in constant touch on the subject.

I would have to say that I am not satisfied that we have done as much as we could. We are trying to discern what we might do, where we can go, how we can be.

Two things I know are clear. One, there needs to be a better appreciation in this world of the exact dangers you were so well describing, Senator. And I am not sure that except in relatively small segments of society around the world those dangers are as well understood as they should be.

I think perhaps they are better understood in this country than in most areas. They are not all that well understood even here. There are in some segments of the society clear perceptions of the dangers. There needs to be a better understanding of the dangers.

When people feel and understand the nature of the dangers that confront them that often helps move governments to sensible policy. We think that as well there needs to be, and this we are working at, a continuing move along the lines that I suggested to get all of those who are in the supply business, if you will, to see the problem in precisely the same light and act, therefore, in concert.

But even then we should not take total comfort because, as Secretary Davis pointed out, this technology is now more than a quarter of a century old and a quarter of a century in any technological development, no matter what security surrounding it is, becomes fairly well understood.

It does not imply that I would agree that the coffee can bomb is just around the corner, I don't believe that. I think it is a much more complicated process. Nonetheless, it is a very dangerous situation and we need to get everybody seeing the danger in the same way. That important step first.

We need also to strengthen the international institutions and support those that are engaging in these issues.

That, it seems to me, implies not just the International Atomic Energy Agency but the U.N. General Assembly and the Security Council as well. Become involved; understand the nature of the problem. And we need to put more effort on this and we are going to.

Senator PERCY. I thank you very much, indeed.

We do not have two more knowledgeable devoted public officials than the two of you in this field. I know we will be out in reelection efforts after we adjourn. We will be talking to a lot of people about this subject and should there be time at that point when you would like to call upon our staff to work with you in any way to

find a better answer—we pointed out the inadequacies of legislation we offer and not the completeness of it, we would like to refine it, improve or back up and support what we are doing with every possible government.

We serve in the Foreign Relations Committee; we put on two hats and work with countries in trying to bring them around to our point of view. There is nothing more important that we can all be working on. We pledge our support to you.

I will recommend very strongly that members of this committee that could not be here go over the testimony and I would ask staff to send copies of the testimony today to Senators and leadership, and Senator Cranston, who has devoted himself years in this subject, I know he will benefit tremendously as others in the leadership with this testimony.

Senator GLENN. Mr. Davis, we are basically changing our policy with regard to Japan and we are changing our domestic policy with regard to Barnwell, to allow reprocessing and plutonium production.

I believe you helped prepare a draft of a DOE paper recommending U.S. purchase quarantees for the plant in the 1984 budget to expand up to $250 million on this.

The only company I know involved in this is Bechtel. Does this pose a conflict of interest for you?

Mr. DAVIS. Mr. Glenn, as far as the development of policies relating to stimulating the private sector assuming responsibility for reprocessing, this is something that I worked on. Other people in the Department have worked on it, and I had helped prepare the various papers that are involved in this. These are aimed at various measures that might carry out the President's decision to revitalize private interest in reprocessing. Barnwell is a plant that does not belong to the Department of Energy. It is a private plant and we have no financial interest in it whatever.

Insofar as Bechtel is concerned, they have indicated they are not interested in purchasing it.

I do not know what their exact interest is. I have not associated myself in any way in any decisions concerning their preparation; I do not plan to.

Senator GLENN. How about the policy shift with regard to Japan and other nations? Bechtel is the only company I know negotiating with Japan. In the confirmation hearing you took an oath and by the Department of Energy's own internal memorandum on this, or their own criteria, they said even the appearance of any conflict is to be avoided.

How does this involvement of Bechtel square with your pledge?

Mr. DAVIS. I am not aware in any way what Bechtel is proposing regarding Japan. I know they are interested. That goes back to the time that I worked for the company. I had nothing to do with any approvals or disapprovals of their requests.

I repeat again insofar as developing broad Government policies, I think that is my job; I intend to do it. There are a lot of companies who may benefit or may suffer from it, but no one has been singled out and I am not singling out any.

Senator GLENN. Mr. Kennedy, to use your words, we want to get all countries in the nuclear supply business to act in concert. Why

wouldn't the President bring this matter up with the nuclear suppliers at the summit conference at Ottawa and Versailles even after Senate resolutions urging this passed unanimously 2 years in a row?

Mr. KENNEDY. Senator, as I mentioned a moment ago, there is, I think, a growing sensitivity to these issues. It has always been there. I think is is coming closer to what one might call a front burner.

Senator GLENN. What pressures have we put on any nation to not supply? We were not successful in preventing the French from building a reprosessing plant in Pakistan?

Mr. KENNEDY. We are in touch with them on a continuing basis.

Senator GLENN. They just ignore us.

Mr. KENNEDY. Not often. The cooperation rate is increasing.

Senator GLENN. Where have we prevented any sales of equipment? I grant Mr. Davis' comment earlier that the technology has been around but the ability to manufacture the equipment is not that widespread even to this day and that is what has given us a narrow window of time in which to operate before that capability gets more widespread, then all bets are off.

Mr. KENNEDY. There are a number of such cases and I will be glad to provide that for the record, and I think it should be in classified form.

Senator GLENN. I would like to have it and we will consider it classified. That is fine.

We are at a real separation point between what Government policy has been and what direction we are going to take in the future. Back when we were working in the Nonproliferation Act we debated for a lengthy period of time whether we were going to work actively on a government-to-government basis to try to control the threat of nuclear technology spread or whether we were going to involve American business to the maximum extent around the world, and promote sales as our primary goal and try to gain influence by that means. We debated this long and hard and thought about it extensively.

Mr. DAVIS, you have spent a lot of time on this question. Congress spent a lot of time and we didn't make those decisions to favor the sales approach. For a while I was on that side. Gradually, the more we looked at it, it became apparent that was not the way to go. I changed my viewpoint after having studied this very thoroughly. We were trying in the Nonproliferation Act to use the narrow period of time we have to prevent the spread of technology and equipment around the world that could be used tomake more and more weapons. And we can best control that, at least during this time period, through government-to-government regulation, very tight control: Americans would lead, and we hoped others would follow.

We included the International Nuclear Authority as part of the act to put the nuclear cycle hopefully under its aegis, so nations would not have a reason to want reprocessing and breeders under their own control. And we went that route after much study, and that has been the policy of our land up to now. It has not been perfect, and I grant you that, but I think it helped build up international restraints and slowed the spread of nuclear weapons around

the world. I am bipartisan in criticism, the Carter administration was certainly far from perfect. We waffled the first time the NNPA came up when we confronted a tough decision on the fuel shipment to India. I lost that on the Senate floor 48 to 46. Anyway, this administration came in—you were part of the transition team that wrote the nuclear policy—and it set about from the early days and virtually dismantled the policy we have been following. That is what we have seen as the attitude of the administration since that time. You are tending now toward business as usual, get American business involved, sell to everybody, promote plutonium. As long as we get American business involved, that is the most productive thing we can do you seem to be saying. That is a real change of policy.

That is our impression at this end of the avenue. If we are to make that much of a switch, and how we can do that and still say this fits under NNPA escapes me.

Mr. KENNEDY. I don't think that is the policy at all.

Senator GLENN. If it isn't, I am being misled.

Mr. KENNEDY. Let me go back for 1 second to that transition report. I am aware of the transition report, I participated in some measure in it. But as I have indicated to you in the past, I think if one looks at that transition report, many of its recommendations, you will find that to a very large extent those recommendations were not put in place.

Senator GLENN. There was a great deal of publicity on that and the Washington Post came into a copy at the same time we did. Maybe I was wrong, but we got a lot of publicity that might have given the people in the administration second thoughts about implementing the policy as outlined.

Mr. KENNEDY. I won't argue that question one way or the other, and I will be delighted for you to take credit.

Senator GLENN. No, I didn't mean to take credit for anything. Give the Washington Post credit, they are the ones that put it on the front page.

Mr. KENNEDY. Let me just say that we are not receding from the basic principles that we started with, we are not overturning policies, turning them upside down. We are operating wholly within the letter and the spirit of the NNPA, and we will continue to do so. There isn't any question on that score. The objectives that we have are precisely the objectives that you have, that the Congress had when it wrote that act.

Senator GLENN. Mr. Kennedy, the nub, the heart of NNPA was that we would prevent the spread of reprocessing and enriching equipment around the world because with that went the ability to enrich fuel to weapons grade or to separate plutonium for weapons. Now we are proposing to give blanket approvals for reprocessing and plutonium production. How we can say we are going to allow more plutonium centers spread around the world and argue there is less likelihood of nuclear terrorism by a group that gets plutonium or enriched uranium, and how we can say we are going to be safer with this policy than we are with existing policy escapes me.

Mr. KENNEDY. As I said in my statement, we are not spreading this stuff around the world. We are looking at the world which exists today, the last 4 years notwithstanding, looking at the world

as it is today and saying, how can we deal with that world in a way which would further the nonproliferation objectives which we share?

Senator GLENN. Tell me how the world has changed since 1978 when we wrote the act?

Mr. KENNEDY. The Japanese and Europeans have gone full bore with their programs of reprocessing.

Senator GLENN. So we are to say because they have not followed our lead perfectly that we want to go full bore with them?

Mr. KENNEDY. Not at all. What we are saying is that is a fact. It is there, you cannot ignore it. How do you deal with it if you still have in mind a serious nonproliferation regime? The answer, it seems to us, is to participate in it so that you can get the safeguards locked into those systems while they are building them, and sit down with them and work out a system of controls which give us consent rights we now do not have in respect to the use of that material.

Senator GLENN. Can we not have a quid pro quo, then any of their additional work that they do with other countries, those other countries would have to be 100 percent safeguarded?

Mr. KENNEDY. We are not putting these things as quid pro quo.

Senator GLENN. Why not?

Mr. KENNEDY. Arm twisting does not necessarily always get you the objective. Persuasion very often does, and persuasion together with sensible relationships may well. We think that is the road to success. We have exactly that objective. They know it. And we are moving successfully.

Senator GLENN. Basically it seems we are helping to found new centers of plutonium production and enriching capacity and that some of those operating now are doing it with our approval and our cooperation, without which they would not have come operational, or they will exist with more difficulty in the future.

Mr. DAVIS. The British are building a full scale reprocessing plant. The French are building a full scale reprocessing plant. The French are building a full scale reprocessing plant. They both already have reprocessing plants. The Japanese have the Tokai Mura reprocessing plant, and they are planning to build a larger one. Of the two choices it is better in our opinion to try to work with them in these particular instances. Beyond Euratom and Japan we will try to get the best safeguards and consent rights and try to get the best agreements out of them that we can.

The alternative, if we forego that, is we will have no part in any of these actions and our leverage on these will be gone. That in our opinion is a worse situation.

Senator COHEN [presiding]. Are you suggesting you can only influence the nuclear policies of these countries by engaging in the same policies ourselves? You made the statement, or Mr. Kennedy, there needs to be an appreciation of the exact dangers of nuclear weapons. Who has a greater appreciation than Japan? The whole nuclear freeze movement started in Germany and is spreading throughout Europe. Isn't there a significant appreciation of the danger of nuclear weapons? Why do we have to use the rationale that if these countries go full bore in processing these centers, the only way to influence their judgment or sensitize them to the

danger of nuclear weapons is to participate in the process ourselves? Don't we have enough influence with these countries who are our allies to say: You are creating a dangerous world out there and we would like you to not continue along the road?

Mr. KENNEDY. A message which we are carrying to them every single day, as I indicated to you earlier.

Senator COHEN. Why do they need that message if they have been so exposed? Japan, of all countries, why do they need that message?

Mr. KENNEDY. I am not certain that they see the danger to be quite the same. They are not out there selling reprocessing plants to somebody. There has been some of that kind of activity, to the extent that other countries do move in that direction, if they do, in the past there has been an effort brought about not wholly by our efforts, but in a good measure by their own to make sure that safeguards were applied to get the IAEA involved. We have since told them this is the wrong road. And as I suggested to you, we have the belief that that message is getting across.

Senator GLENN. Another thing that concerns me is the security covering plutonium and highly enriched uranium at these facilities. How are we going to make sure this is protected from terrorists and that small quantities are not getting out that could eventually be made into weapons or dispersed as a radiological threat in population centers why should we cooperate in allowing more reprocessing abroad when we cannot even guard our own facilities at home?

Mr. KENNEDY. I am not going to comment on the facilities at home, but it is precisely to the end you are speaking of that we have worked, as you know, to get a convention on the subject, a strong IAEA rule on the subject for the physical security of plants and activities and that has moved very well, And, by the way, that physical security convention is, even now, I believe, before the Senate for ratification.

Senator GLENN. We have inadequate security for plutonium here at home. How are we going to guarantee it around the world?

Mr. DAVIS. Senator Glenn, I don't think we would agree we would have inadequate security for that material.

Senator GLENN. I have a statement I am releasing on inadequate security at our nuclear weapon production plants this afternoon. I have followed this issue for a number of years. GAO has done a number of studies, the first one back in July of 1976; the report was entitled "Shortcomings in the System Used to Protect and Control Highly Dangerous Nuclear Material." On May 2, 1977 GAO did another report, "Commercial Nuclear Fuel Facilities Need Better Security," and GAO wrote still another on March 13, 1980, "Nuclear Fuel Reprocessing and the Problems of Safeguarding Against the Spread of Nuclear Weapons".

I asked GAO for an update on this in February of this year. We have just gotten this report, which was released August 20, 1982. It is classified, but the title is unclassified. The title is "Safeguards and Security DOE Weapons Security Are Still Not Adequate." I cannot go into details of this, but I can assure you from that report that they are not adequate. Moreover we found that last year when DOE submitted their $5½ billion budget in fiscal year 1983 with

some 800 increases, there were funds in that for major security and safeguards upgrading, but when OMB asked for a reduction of 12 percent across the board in the DOE defense programs the total amount for these security and safeguards upgrades was eliminated.

We are doing nothing to correct this. And this is a problem that goes back well into the Carter administration, too. So I would repeat my statement that I do not think our security is adequate. I am sure you have the report. $126 million apparently would take care of most of the security deficiencies by DOE estimate and yet we zeroed it out of the budget.

Mr. DAVIS. Senator, we have received the report recently. We are studying it to see what our conclusions are.

I don't believe we agree with all of the conclusions in the report by any stretch of the imagination. We are continually upgrading the system. We do recognize it has some shortcomings, which we are proposing to fix. That is about all I can say in the open hearing, but we are conscious of some of the problems. I do not think they justify a conclusion that we do not have adequate safeguards. I think they may justify the conclusion that we may improve them.

To say they are not adequate I do not believe is correct.

Senator GLENN. I would be glad to talk to you after you read the report in its entirety, as I have done. I think you will change your mind.

Mr. DAVIS. Our staff has read it.

Senator GLENN. Have you read it yourself?

Mr. DAVIS. I have not read it myself.

Senator GLENN. I suggest you read it. I think you will be convinced.

Senator COHEN. I have a couple of points, but we had hearings in the Armed Services Committee recently about the inadequate safeguards in our nuclear facilities and our weapons programs. In Groton, we had a group of nuns who sailed in with a canoe and gained access to a submarine. If you want to talk about inadequate protection of nuclear weapons, we have it right here in our own country.

Let me ask you about Taiwan and Korea, countries which expressed strong interest in developing reprocessing technology for commercial purposes. My understanding is that both the Ford and Carter administrations worked very strenuously to avoid that taking place. Does this administration intend to do the same?

Mr. KENNEDY. There is no change in that policy whatever, Senator. And there is none foreseeable.

Senator COHEN. Mr. Kennedy, I believe you talked about your looking at sanctions. Do you think it is wise to talk about having a policy without having first thought about the sanctions included as part of that policy?

Mr. KENNEDY. Senator, there are a variety of kinds of sanctions that have been visualized for years. The question is whether in fact they would have the effect that you need. It is not that there are no sanctions applicable that could be applied now, it is only a question of looking to find out if there aren't any more effective ones and if the whole international institution cannot be strengthened to make such sanctions as now exist more effective.

Senator COHEN. Have we ever found the sanctions have worked in the past?

Mr. KENNEDY. Not very effectively. I guess the most effective sanctions, and that is not quite the word, I suppose, is more solid influence, creating circumstances in which a country finally concludes that its own interest is being damaged by a move toward a weapons program, and that country won't go that route, we think.

How you do that remains to be seen. It is obvious that in some circumstances that is the policy we are not pursuing and I hope with a substantial measure of success. That is the first side of the coin. The other side is if you are wrong, what then, what can you do to make the cost unbearable. That is the kind of thing we are looking at.

Senator COHEN. I have never seen an example where we tried to impose sanctions on other countries, be it commercial or otherwise, that we think would be against our interests and those of the free world. And I think going back to the Soviet Union, it is very difficult to get Europeans to agree to any sort of effective sanctions against the Soviet Union principally because they do not see it to be in their commercial interest to do so. I would suspect that that is also going to be a very serious consideration here. To give you an example of what I am talking about, in terms of the grain sales, one of the motivations behind formulating this whole détente, would be a carrot and stick policy.

I know on one of the pieces done on this particular subject matter, the criticism was that Carter's policy was all sticks and this proposal tends to be sticks and carrots. And one of the basic underlying reasons for having détente was that if the Soviet Union created this web of interlocking interests, and if they behaved in an aggressive or imperialistic way, we would pull back some of those interests to their detriment. What we find is that we are the ones who usually become subject to the sanctions ourselves. And that is particularly true with respect to the farmers. There is no more anti-Communist, nor more Bible quoting, religious, dutiful patriots in this world than the American farmer, except when it comes to cutting out grain sales to the Soviet Union. Then they will roll their tractors all over the Rose Garden in order to say, "You shall not tell us where we should dispose of our crops." I suspect we have the same sort of problems on the international level with either Japan, the Europeans, or the French or anyone else who see it in their basic economic interest to go forward, whether in the sale of grain or natural gas or the sale of this type of technology.

I don't see the sanctions as being particularly helpful.

Mr. KENNEDY. One comment. Senator, the wisdom of what you say is self-evident. The point is that it is not just the economic interest here. The question is whether the long-term security interest can be perceived in the right framework and, as I mentioned, whether the international institutions which exist can be brought to bear because this is a little bit different in the sense that you are talking about an action which is inconsistent in a very substantial way with a series of established international norms; that is, you would have a safeguard violation, a move, something which the

community has already established as inconsistent with international behavior.

Now, if you have a country which has agreed to the NPT or has accepted safeguards arrangements or has in fact participated in the IAEA, then action of this kind is inconsistent with any or all of those participations.

Whether the institution can be strengthened to take aboard that question in a meaningful, strong way will have some bearing on whether any kind of sanction can be made effective.

Senator COHEN. The reason for my skepticism, is that it reminds me of the situation we had with India a couple of years ago. The members of the administration came before us at that point and said, "We will have a greater opportunity to exercise leverage over India if we agree to the sale than if we cut it off." That was the rationale at that particular time. And I couldn't help but think as Mrs. Ghandi came over to visit with us a few weeks ago about the question of peaceful explosion of a nuclear device. I have never been able to understand what a peaceful explosion of a nuclear device was, yet they will continue to exercise their sovereign rights to do so. I was wondering whether or not India would tolerate Pakistan's continued development of nuclear devices.

Mr. KENNEDY. I suspect peaceful devices are in the eye of the beholder. But it is to be recalled in all fairness, some of the first peaceful devices were those that we exploded ourselves in programs that we thought at the time, as I recall, to have substantial promise for canal digging and deep mining gas products.

We subsequently learned that they were not necessarily the economic boon that they might have suggested on the one hand, and they also brought a number of operational problems with them. And it is a fact that we now state very clearly that we couldn't discern the difference between a peaceful explosion and a not-peaceful explosion, they all essentially stem from the same device, the same kind of device, and the result can well be the same.

Senator COHEN. So if the Pakistanis were to announce they wanted to dig a canal in Pakistan and would explode a nuclear device, do you think that might cause some problem in India?

Mr. KENNEDY. We have made it very clear in the highest level of the Pakistan Government that we do not differentiate between——

Senator GLENN. Especially if they wanted to dig it in India. [Laughter.]

Mr. KENNEDY. There can be no doubt whatever in the minds of the leadership in Pakistan how we think about that issue and I am confident they have some appreciation of the actions of the Indians.

Senator COHEN. Do you have a detailed description of the safeguards that other countries choose, West Germany, France, Japan, what they insist on in terms of safeguards?

Mr. KENNEDY. Detailed—I don't know that I would describe them that way. We have a fairly good perception on the safeguards system.

Senator COHEN. On the whole, are they as stringent as ours or less so?

Mr. KENNEDY. The answer is less and in some cases, I think, they vary. Some even better.

Senator COHEN. So, would you suppose if we enter into such arrangements with Europe and Japan that we are going to maintain our own safeguards, our own standards, or will they be diluted in any way?

Mr. KENNEDY. They will not be diluted in any way, Senator. Our objective is the highest standard and that may even mean as we work with them in some of these systems upgrading them, which is one of the purposes, by the way, of participation.

After all, we are not in the business of participating in building a reprocessing plant for its own sake.

One of the reasons that we would be willing to facilitate it would be to get an agreement from them as to all of the safeguards and the nonproliferation regime that would surround it and to actually get the benefit of participation in developing the systems which would most effectively safeguard those kinds of plants.

Senator COHEN. For example, would you insist that the new regulations which are being proposed for now in the virtually defunct Department of Energy would be the same ones we would insist for compliance with other countries so they couldn't go indirectly to the export of these technologies by using foreign licensees?

Mr. KENNEDY. The answer is yes.

Senator COHEN. Senator Percy has a number of questions which I will submit for the record, and the record will stay open for a week.

Senator Glenn?

Senator GLENN. I have more questions and I also have a list of questions by Congressman Derrick, that I would like to submit to be answered and included in our Senate record.

I have a couple of more questions, and you gentlemen have been very patient with us.

On the question of safeguarding reprocessing plants, we have heard reports, and I couldn't verify this, I would ask your comment on it, Mr. Kennedy, about safeguarding the Tokia Mura plant in Japan.

There has been some question that indicates the Japanese have never permitted the IAEA to independently verify the material balance of the plant, that that has been refused. That is a rather fundamental safeguards technique, of course.

We are saying that Japan's nonproliferation credentials are superb and that their cooperation on the Tokai-Mura in particular has been excellent.

However, is it true, to your knowledge, that IAEA has been stopped from conducting the full range of safeguards activities it wishes to perform in the facility?

Mr. KENNEDY. To my knowledge, that is not true.

Senator COHEN. Has the staff heard any report on this?

Mr. KENNEDY. So far as I know it is not true. Let me say that my recollection is that there has been discussion from time to time between the Japanese and the IAEA inspectors when the Japanese have wished to participate with the IAEA inspectors, but that was an observation role, but in no way influencing what the IAEA inspector saw or reported.

Senator COHEN. Can you query IAEA to that because that calls into question the whole concept of timely warning which is the

basis of much of what is the Nuclear Non-Proliferation Act and our policy at the present time, so if there was a difficulty it is something we have to take into consideration.

Mr. KENNEDY. There is none that I am aware, but I will in fact inquire again of the Safeguards Division and report it to you.

Senator COHEN. We appreciate that.

There has been considerable discussion of gaining foreign participation in the Barnwell facility. The German consortium DWK has been mentioned, for example, in the paper by Mr. O'Donnell of Bechtel, the possibility of reprocessing spent fuel for such countries as Korea, Taiwan, and Mexico was raised.

Is the intention of the U.S. Government to reprocess foreign spent fuel at this facility?

Mr. DAVIS. The U.S. Government is not involved in the operation of the facility. I know there have been expressions of interest in utilizing the facility by the DWK group; the Department has referred them to the owners of the plant.

We told them that is something they would have to work out with the owners. If DWK were to take an interest in the plant, they would have to send their fuel to the United States for reprocessing and take the byproducts back to Germany.

Senator COHEN. That is something that has to be approved by us?

Mr. DAVIS. That is something that has to be approved before it could be done.

Senator COHEN. Would all the waste remain; would it go back out? What would be the disposition of the waste?

Mr. DAVIS. There has been no determination of that because there has been no proposal or resolution. I would expect in all probability we suggest the waste be returned to them.

Senator COHEN. That would be part of the negotiated process.

Mr. DAVIS. That would be part of something negotiated sometime in the future if a proposal were made.

Senator COHEN. I know we had some disagreements on this change of policy, gentlemen, and whether it still fits under the Nuclear Non-Proliferation Act or not and we have our differences on that whether it is outside the scope of the NNPA.

Have you had any legal analysis by State Department counsel or anyone else run on this, and do you have an opinion you can submit to us? We will have our own legal exports look at it and see whether they look at these things in the same way, which I doubt in advance.

Mr. KENNEDY. We have looked at it very carefully, Senator, and I will be glad to furnish a formal opinion.

Senator COHEN. We have looked at it very carefully at this end of the avenue. And the reason I ask the question is not to show we have some disagreement. The reason is if there are disagreements, and if we do need some changes or we do need to stop something you are doing or we are doing, it seems to me we ought to be able to get together on this. We couldn't have the law say one thing and you go another direction, if that is the way the law is interpreted here, or vice versa, us insisting on something you are not willing to do on the other end of the avenue.

We had better be getting together and talk some of these over and this hearing is the start and I hope we have some private meetings also to try and work, out whatever these differences are.

Whatever we go ahead with, whether the policy we have been providing in the past or a new policy, we ought to do it with one united voice and not be bickering with international forums with each other which I can forsee happening right now.

Mr. KENNEDY. I couldn't agree more to that.

Let me reiterate the pledge I made in my opening statement. We want to work with you.

Senator COHEN. We want to make it as safe as possible. I hope, Mr. Davis, I really hope we can look into this security of our own stuff here at home.

When we are zeroing out in our next year's budget, the security upgrade we have—I really hope we get on that—I think that has been a big mistake. I think that was a big mistake in the last administration we didn't get it on sooner. The new report we have from GAO makes an even better case than we have in the past, that is only about 2 percent of the DOE budget and that is the least we can do to see this stuff is just as safe as you can make it.

If we are going to more plutonium operation that means it is more critical than in the past.

Mr. DAVIS. Senator, I think the staff will tell you, I am a bit of a nut on insuring the safety and security of our facilities.

Senator COHEN. Then I will be glad you will support that additional $126 million on the continuing resolution.

Mr. DAVIS. That is a different subject.

Senator COHEN. Thank you.

Secretary Kennedy and Secretary Davis, I appreciate your testimony before the subcommittee this afternoon. I intend to carefully review the record of this hearing and to evaluate for myself the long-term effects of the policy as you have explained it today.

I want both of you to know that I remain deeply committed to measures which can help prevent problem countries from acquiring weapons of mass destruction.

[Mr. Davis' prepared statement and responses to written questions submitted by the subcommittee follow. Responses from Ambassador Kennedy to questions from the subcommittee also follow:]

PREPARED STATEMENT OF W. KENNETH DAVIS

Mr. Chairman, I am pleased to have the opportunity to appear before this Committee to discuss recent developments in the Administration's non-proliferation policies and the role of reprocessing and plutonium in advanced nuclear power programs.

In the process, I shall try to respond to the various points raised in your letter of July 30, 1982. You requested that I comment on a number of specific questions relating to reprocessing, including operating experience, economic viability, and safeguardability of facilities. You also requested my comments on the relationship of the Administration's position on reprocessing and plutonium use to certain requirements in the Nuclear Non-Proliferation Act (NNPA) and on the desirability of Congressional consideration of legislation prohibiting the export of sensitive nuclear technology, including reprocessing.

In examining recent policy developments, it is important to do so from the perspective of longstanding U.S. non-proliferation objectives. Since the end of World War II, seeking to avoid the spread of nuclear weapons has been a major and continuous element of U.S. foreign policy that has received the strong support of the public, the Congress and an unbroken succession of Administrations. The Reagan

Administration is as firmly committed to attaining the objectives of this policy as any of its predecessors.

We also recognize nuclear power has an important role to play in meeting the demands for electricity within the United States and other countries. We see a continued correlation between the use of electicity and economic growth and share with our allies a common interest in meeting future energy needs and in reducing an undesirable dependence on imported oil. While we believe coal will of necessity have an important and expanding role to play, we believe it would be highly unrealistic and imprudent for a variety of reasons to rely on coal as the sole primary electrical energy source of the future.

Within the U.S. we foresee that nuclear power will satisfy about 25 percent of America's needs for electricity by the early 1990's. Other countries also are projecting substantial increases in the energy contributions from their nuclear programs, notwithstanding the current slump in the global economy. France, for example is likely to fill 68 percent of its electricity demands through nuclear by 1990, and Japan plans to supply 22 percent of its electric power requirements from nuclear power plants by the year 1990.

The U.S. has had a leading role in fostering the peaceful uses of nuclear energy for years. However, during the previous Administration, U.S. policies were interpreted as antagonistic to nuclear power. In particular, the U.S. position on the role of the breeder and reprocessing in the planned commercial nuclear programs of some of our close friends and allies was viewed with distrust.

This Administration has been endeavoring to remove unnecessary regulations and restrictions to the U.S. domestic program and to engender trust and predictability in our nuclear relationships with cooperating nations. In my view, we are doing this in ways that accord high priority to and will promote our non-proliferation objectives. Indeed, I am convinced that our general effectiveness in the non-proliferation field will depend on maintaining our current course. The changes made in our export policies in 1977-78 led to serious tensions and diminished the confidence of others in the U.S. as a stable and reliable partner.

Domestically, we are trying to introduce greater efficiency in the process of licensing light water reactors. In addition, the breeder reactor has great potential for extending the uranium resource base. We are seeking to restore our comparative technological lead in this field through completion of the Clinch River Breeder Reactor.

Also, since it is crucial that the utility industry see a clear, consistent government policy for closure of the back-end of the fuel cycle, we are aggressively pursuing establishment of a waste disposal system—with strong Congressional support on a waste management bill—and we have removed the ban on commercial reprocessing that was imposed by the last Administration.

Internationally, we are seeking to resolve nuclear fuel cycle issues with some of our closest allies to enhance both our nuclear cooperation and non-proliferation objectives. To this end, we are offering new long-term understanding with the Japanese and Euratom on implementation of consent right as they apply to their reprocessing and plutonium use programs. In Japan and Euratom countries with advanced nuclear programs which do not pose any proliferation threat, we are convinced that the US interest will best be served by granting them longer term programmatic approvals. This is based on achieving satisfactory mutual understandings with these nations on enhancing international cooperation to improve the non-proliferation regime and safeguards.

Any new programmatic consent must meet our statutory requirements and will be granted only within the context of arrangements and procedures in the Atomic Energy Act and will be subject to appropriate Congressional review.

By taking these domestic and international actions, I believe that the US can reassert its leadership in international nuclear affairs and thereby enhance its global influence in the field.

It becomes more difficult to influence the course of other nations' programs if our domestic nuclear power programs lacks momentum and clear direction. We cannot assure that breeder and reprocessing programs of Japan and Euratom are shaped to facilitate the application of effective controls unless we, ourselves, are active in these areas. Having said this, it is important to underscore that the Administration clearly understands that the breeder and reprocessing activities as well as the use of plutonium must be effectively controlled. Accordingly, we strongly believe that stringent safeguards will have to apply to these activities, and, as the President has stated we will continue to oppose the spread of sensitive technologies and materials, particularly in unstable regions or where there is a proliferation risk.

The technology of reprocessing is approximately four decades old and has been basically unclassified since the later 1950's. It is judged by the French, the Japa-

nese, the British, the Germans to be important to their ongoing civil nuclear power programs. These nations of Japan and Euratom that favor reprocessing in their nuclear power programs do so for several reasons. First, they regard reprocessing as essential for making full use of the nuclear fuel available to them, especially to allow development of the breeder which many of our closest friends consider vital for their energy future.

Second, they believe it is an important and useful way to prevent spent fuel from accumulating beyond the capacity of the spent fuel storage pools at reactor sites. Third, they believe that it provides major waste disposal benefits by reducing the volume of high-level waste and producing a waste form especially engineered for disposal.

It is generally recognized that reprocessing plants must be large to be economically viable. Many nations do not wish to acquire they own reprocessing plants and prefer instead to utilize reprocessing services offered by a few large countries, such as the UK and France. For non-proliferation reasons, we have a clear interest in limiting the number of such facilities around the world and thus have favored the idea of exploring the possiblity of structuring new plants on a multinational basis or under terms of providing services to others.

A key element of this Administration's non-proliferation policy is recognition that we should tailor our attitudes toward country-specific situations.

Thus, the Administration neither categorically supports nor condemns reprocessing and plutonium use for all countries. Neither do we visualize authorizing the transfer of reprocessing technologies beyond Japan or Euratom. To the contrary. While there may be some cases where associations with reprocessing projects in these countries will be in the US interest, these will be approved only when we are convinced they are supportive to our non-proliferation objectives and if the required statutory determinations are met.

I would now like to comment on the specific questions you raised in your letter of July 30. You asked me to comment on the operating experience at reprocessing facilities, particularly with regard to safety, efficiency, and application of safeguards. The Department of Energy (DOE) and its predecessor agencies have been in the forefront of the development of reprocessing technology, plant designs, and operations. Based on our experience in the development and successful application of reprocessing technology, we are convinced that reprocessing plants can be built and operated safely, efficiently, and economically, without significant deleterious environmental effects, with adequate safeguards, and with lifetimes well in excess of 25 years.

The basic technology associated with reprocessing techniques and the design of reprocessing facilities is well understood, developed, and proven. The first commercial plant in the world for reprocessing of spent fuels from commercial nuclear power reactors, the Nuclear Fuel Services Plant at West Valley, New York, was operated from 1966 until 1972 when it was shut down for modification and expansion. The plant operated at about 60 percent of its design capacity, but was limited in this respect due to a lack of additional spent fuel to process. The operational problems experienced by this plant provided valuable insights, and plant designs since that time have been formulated to prevent possible reoccurence of the operating difficulties experienced at West Valley.

A number of other reprocessing plants have been built and operated throughout the world. Most of these have been used for demonstration, personnel training, and research and development purposes. They have not generally been operated as "production" plants. A production-scale reprocessing plant in France was modified to accommodate LWR spent fuel. While this plant may not be considered to represent the optimum design for the reprocessing of LWR spent fuel, it is currently reprocessing fuel on a commercial basis for customers in Europe and the Far East. I believe the fact that its "order books" are full is further evidence of the demand for reprocessing services and its relative economics.

Further, I would note that plans are in process in France, Japan, the Federal Republic of Germany and the United Kingdom to proceed with reprocessing programs. These nations believe their overall experience with reprocessing has been sufficiently good to justify expanded programs. Relative to the economic justification for proceeding with reprocessing at this time, I believe the ultimate judgment of economic feasibility will come from the private sector. I would not expect the private sector to carry out a reprocessing initiative strictly on the basis that the establishment of a U.S. commercial reprocessing capability will provide many significant national benefits, including the furtherance of our non-proliferation objectives, or on the basis of the ethics of resource conservation.

The private sector utilities will be the ultimate customer and will make their decisions considering the various parameters of reprocessing economics. From a utility perspective the cost of reprocessing must be less than or equal to the combined values of: (1) the plutonium, (2) the uranium, (3) any waste disposal cost savings, (4) cost savings attributed to avoidance of spent fuel storage costs, and (5) relative transportation costs. Based on my experience in this area, I would estimate that combined values of these parameters could range from $300/kg of heavy metal (HM) to $800/kg HM. A reprocessing fee for the Barnwell Plant could in turn range anywhere from $200/kg HM to $500/kg HM. It is therefore my opinion that reprocessing could be economically attractive to both reprocessors and utilities. Further, I would note that foreign entities are currently paying well over $700/kg HM for reprocessing services.

However, as reflected in the wide range of possible values discussed above, there are major uncertainties relative to reprocessing. Uncertainties in government policies, regulations, and laws are a primary cause of these uncertainties and they form the basis for the efforts this Administration embarked on last October in response to the President's policy statement. Specifically we are now trying: (1) to resolve as many as possible of the Government controlled or imposed uncertainties regarding reprocessing and (2) to assure stability in policies and regulations in order to allow the private sector to make reasonable judgments as to the economics of reprocessing.

Given the current state of the U.S. nuclear industry, I believe it is likely to invest in private reprocessing only if there is confidence that the government is truly supportive of the venture, and will adhere to stable policies in order to allow reprocessing. You also asked me to comment on a proposal to perform some additional safeguards experiments with the participation of other nations at the Barnwell plant. Since the Barnwell request for a DOE authorization to allow foreign participation is still pending in the Department, I will not attempt to predict the Secretary's decision.

However, I will offer some preliminary thoughts for your information. In our view, important and useful work designed to improve the effectiveness of safeguards on reprocessing plants has been conducted in DOE laboratories and at Barnwell in recent years. I might mention here that it was the Congress which provided funding for non-proliferation studies at the Barnwell Nuclear Fuel Plant since 1977 over the objections of the previous Administration, and that this effort has borne fruit not only in substantial safeguards advances applicable directly to the Barnwell Plant but also to generic safeguards technology.

Demonstrations of advanced safeguards technology in a full scale plant is a key step both in the development process and in gaining international acceptance of advanced safeguarding techniques. It is our judgment that no "sensitive information or technology" would be transmitted to other nations under the proposed Barnwell safeguards experiment. It should be noted, also, that the experiment would involve only the use of natural uranium in a portion of the Barnwell Plant for a period of about two weeks. Therefore, there is no reprocessing that will take place and there will be no spent fuel, plutonium or fission products present. The primary focus of the demonstration would be on the safeguards part of the plant.

If the project is authorized, Japan most likely would be the other principal party and there would be appropriate opportunities for observation by International Atomic Energy Agency (IAEA) inspectors.

This leads me to your next specific question, namely whether reprocessing facilities can be adequately safeguarded.

There is no doubt that the safeguarding of reprocessing plants presents one of the most formidable challenges for the IAEA safeguards system. Accordingly, this is an area that is receiving considerable attention in the IAEA, in our program of technical support of Agency safeguards, as well as in Agency support programs of other countries, and in the joint studies we have been conducting with countries such as Japan. Overall, I believe that the technology currently exists to adequately safeguard existing reprocessing plants. However, for future larger plants, experts agree that new safeguards approaches that effectively employ advanced technologies currently being developed may be necessary due to the very sizeable through-puts involved.

To accomplish this, safeguards improvements could be incorporated in the facility design, by more comprehensive containment and surveillance devices, by refining the concept of near real time accountability, and by upgrading the chemical analytical facilities available to inspectors. All of these objectives will require continuation of ongoing efforts if they are to be achieved. Also, I believe that full-time resident IAEA inspectors may have to be present at such plants.

Assuming continuing technical progress in R&D and equipment development, continued strengthening of IAEA resources and operational capabilities, as well as continued cooperation by the nations being inspected, I believe that adequate IAEA safeguards can be assured for the next generation of reprocessing plants.

You have requested that I address the relationship of the Administration's new policies in these areas to the requirements of the Nuclear Non-Proliferation Act of 1978.

You also solicited my views as to whether the Congress should consider legislation prohibiting the export of sensitive nuclear technology, including reprocessing.

As I and other Administration spokesmen have stressed, the Administration regards nuclear weapons proliferation to be one of the most serious threats to our national security and to global stability. The Nuclear Non-Proliferation Act, despite some controversial aspects, has given added emphasis to this important area of concern. The Administration's policies are consistent with the provisions of the NNPA, and will enhance, rather than detract from, the preservation of non-proliferation values.

Under Section 303 of the NNPA, the U.S. must determine, in granting approvals for reprocessing and subsequent transfers of plutonium, that there will not be a significant increase in the risk of proliferation, giving "foremost consideration" to the "timely warning" criterion. I can assure you that in processing the proposed longer-term approvals, we fully intend to adhere to this legislative test and will grant such approvals only when all the necessary determinations are met. Additionally, such approvals would be valid only as long as the necessary conditions continue to be met.

As you know, the current practice of providing approvals of retransfers for reprocessing or for plutonium on a case by case basis, has been cumbersome and has created irritations in our nuclear relations with close friends and allies. Even though, after careful analysis, we have never denied a request, cooperating nations and utilities making heavy investments find it difficult to deal with the uncertainties that have been associated with the practices of the past few years. I believe we will realize major advantages in our non-proliferation and energy dealings with the Japanese and Euratom countries if we can now move to granting longer-range approvals.

Also, I see no incompatibility between what we are proposing and the law. As I have noted, we are seeking to grant new programmatic approvals within the context of negotiations on revised Agreements for Cooperation, under which we would seek the additional provisions required by the NNPA, and upon reaching mutual understandings with the cooperating nations on enhanced cooperation on non-proliferation matters.

You also asked that I comment on the implication of Section 403 of the NNPA which directs the President to seek common export policies to limit the number of reprocessing facilities to the greatest extent feasible. Again, I see no incompatibility between the law and our policies since, as I have noted, we favor the concept that reprocessing plants generally should be large in scale and few in number, justified by legitimate program needs, and located only where such activity presents no proliferation risk.

This Administration does not intend to open any floodgates to commerce in plutonium or to dissemination of sensitive technologies.

The new approach for long term approvals over reprocessing and plutonium use is for Japan and Euratom countries already having advanced nuclear programs, well-defined and coherent plans for the use of plutonium, and unquestionably sincere non-proliferation polices. We expect their continued cooperation on non-proliferation matters including strong ongoing efforts to help improve the effectiveness of IAEA safeguards.

In our discussions with Japan and Euratom, we will certainly take into account the requirements of Section 403 of the NNPA. In fact, this Administration has consistently sought agreement from all nations with which we have held discussions that all exports of nuclear materials and technology be subject to guarantees such as no explosive use, full-scope safeguards, adequate physical security, as well as the other provisions of Section 403. We have tried to make it clear that any arrangements the U.S. concludes for nuclear cooperation are subject to termination if a nation engages in conduct proscribed by Section 307 of the NNPA (Section 129 of the Atomic Energy Act).

Another concern that has been raised is the issue of "timely warning" which is a primary test of proliferation risk as defined in Section 303 of the NNPA. The question here is, in cases where large scale uses of potential weapons material are involved, can we be confident of our ability to detect and respond to diversions of material in time to head off the actual fabrication of nuclear weapons.

The improvement of safeguards with respect to reprocessing and plutonium use is an urgent priority. Moreover, it must be emphasized that we do not rest our confidence of obtaining timely warning on safeguards alone. We believe that timely warning should be assessed against the broader political and security factors in a given case, including domestic stability, links to the United States, and perceived incentives for proliferation. Only by looking at such factors can we make a prudent overall judgment about the risks of plutonium use.

In the case of Japan and Euratom, it seems clear that these activities present no proliferation risks. Any decision by these countries to develop nuclear weapons would necessarily reflect larger changes in security policies of such magnitude that would certainly give us ample advance warning. For other countries with good non-proliferation credentials and with which we have cooperation agreements, we will offer advance, long term consent for retransfers of spent U.S.-origin fuel to the United Kingdom and France for reprocessing in facilities which meet the applicable statutory criteria. Such arrangements will be handled on a case by case basis. Any disposition of the plutonium will be subject to separate arrangements.

Finally, Mr. Chairman, I should like to comment, as you have requested, on the desirability of amending the law to ban the export of sensitive nuclear technology, including reprocessing.

In my view, such legislation is unnecessary and would be seriously harmful to U.S. non-proliferation interests.

It is unncessary, since consistent with the practice of many years, the Executive Branch intends to adhere to a policy of not sharing sensitive technologies with other nations except for those few close allies where such cooperation is under consideration and to adhering to the already strict controls contained in the NNPA. When any such actions are taken they will be only in the context of arrangements that are supportive to U.S. non-proliferation objectives.

More broadly, I believe that such an effort to revise the law so soon after passage of the NNPA would be seriously harmful to the U.S. image as a stable and reliable nuclear partner. Other countries would view us as involved in a protracted nuclear debate and prone to make unilateral changes in hope of attaining unrealistic objectives. This could only serve to aggravate the already harmful tendency of customers to turn to other nuclear suppliers and could further lessen U.S. influence in international nuclear affairs.

RESPONSES OF MR. DAVIS TO WRITTEN QUESTIONS SUBMITED BY THE SUBCOMMITTEE

Question 1. The United States has not engaged in reprocessing for civilian purposes for many years, yet has nonetheless continued to enjoy international leadership on technical questions pertaining to safeguards. With regard to assuring that adequate safeguards are applied to plants in Japan and EURATOM, what additional opportunities or benefits will result from U.S. domestic use of plutonium fuels and acquiescence in their programs, that the United States could not otherwise expect to enjoy?

Answer. There is no direct relationship between commercial reprocessing and plutonium use in the U.S. and our ability to assure that adequate safeguards are applied at reprocessing plants in EURATOM and Japan. However, inability to demonstrate some of the instruments and techniques developed by the U.S. for use in such facilities has hampered their acceptance elsewhere. This is particularly true of some near-real time accountancy techniques.

Japan and EURATOM plan to build reprocessing plants with or without our acquiescence. However, by cooperating with them we would expect to be able to work more effectively to influence IAEA safeguards applied to new facilities in Japan and EURATOM. In particular, cooperation with our key allies can provide us the opportunity to work with them to minimize the proliferation risks associated with such facilities, most importantly, by designing plants to facilitate the application of effective credible safeguards.

Question 2. Are the safeguards now in use or expected to be used at reprocessing plants in Japan and EURATOM so inadequate as to require U.S. involvement in their programs?

Answer. We believe the safeguards for reprocessing plants now in place in EURATOM and Japan are adequate given the size and method of operation of those facilities. Those facilities presently under safeguards are modest in size and, while posing a challenge to the IAEA, are manageable from a safeguards perspective.

U.S. involvement in future reprocessing plant programs in Japan and the EURATOM states can help ensure the adequancy of the safeguards applied. By working

closely with these advanced countries, the U.S. will benefit from the exchange of safeguards technology development results. The U.S., Japan, and EURATOM has been cooperating in this area for several years to the mutual benefit of all concerned. It has proven to be a most effective support for the USG to promote and implement its nonproliferation policy. The safeguards developed are made available to the IAEA and some of these safeguards techniques are now being used by IAEA inspectors at the Tokai-Mura Reprocessing Plant in Japan.

Question 3. On Monday, September 13—4 days after your appearance before this subcommittee—Mr. Gordon Chipman asserted emphatically in a telephone conversation with a member of the minority staff of the subcommittee that operation of the Barnwell, S.C., reprocessing plant was not essential to the Clinch River Breeder Reactor Project because DOE has "assumed" that fuel for "the FFTF and Clinch would come from Defense Programs." This statement appears to be directly at odds with your testimony. Please explain this inconsistency.

Answer. The testimony given is not inconsistent with Mr. Chipman's statement. There are a number of possible sources of plutonium for the Clinch River reactor. The defense programs stockpile of reactor grade material is one. Barnwell is another. No one source is critically linked to Clinch River. As DOE's environmental report on the NRC licensing proceeding on CRBRP indicates, DOE will supply plutonium to start up and operate CRBRP during the five-year demonstration period. The plutonium will come from existing DOE inventories, processed domestic nuclear power reactor spent fuel or, if necessary, foreign sources.

RESPONSES OF AMBASSADOR KENNEDY TO WRITTEN QUESTIONS SUBMITTED BY THE SUBCOMMITTEE

Question 1.1. Has the IAEA ever been impeded in its sample taking or shipping activities at the Tokai plant?

Answer 1.1. Based on the information available to us, it is our understanding that the IAEA has not been impeded in its sample taking at the Tokai plant. There have been some delays, however, in the shipment of safeguards samples from time to time because of such factors as complicated procedures for approving shipments and air carrier regulations. There has been some improvement over the last few years, and improved sample preparation techniques (specifically the resin bead method) should help to reduce these dalays in the future.

Question 1.2. How frequently has the Agency been able to ship samples to its lab?

Answer 1.2. The Agency routinely has samples shipped from Tokai to Seibersdorf. Based on the limited information available to us, our best estimate is that such shipments are made once a month during a reprocessing campaign.

Question 1.3. Has the delay involved in these shipment affected the quality of the samples, and if so, to what extent?

Answer 1.3. Our understanding is that delays in shipment have little if any affect on the quality of samples prepared using current techniques (spiking and resin bead). There were problems in obtaining accurate analytical results from aged samples of solutions prepared by other techniques.

Question 1.4. Has the IAEA ever closed the material balance at Tokai on the basis of independently verified samples? How long has this taken, and how does this period compare with the IAEA's safeguard objectives for safeguarding reprocessing facilities?

Answer 1.4. We understand that the IAEA has independently verified the material balances at Tokai. The Agency requires that a balance be struck, and a MUF determined, at least once a year. (Presumably the actual frequency would depend on the level of reprocessing activity at the plant and we understand the facility operator closes the material balance following each campaign). Instruments developed through TASTEX and installed at Tokai allow the Agency to monitor continously some aspects of the material flow through the facility. It is our understanding that the procedures being applied at the Tokai plant are consistent with the IAEA's safeguards approach and objectives for safeguarding reprocessing facilities, taking into account the continuing developing of some of the advanced techniques studied during TASTEX.

Question 2. In considering the programmatic approvals for plutonium related activities in Japan and EURATOM, which facilities are possible candidates for such approvals? (Which reprocessing plants? Which research facilities and activities?)

Answer. 2. The Administration's policy toward reprocessing and the use of plutonium in Japan (and the members of the EURATOM) involves an offer for advance, long-term consent to reprocessing, retransfers for reprocessing and use of plutonium

in programs for which available information allows the United States to make the determinations required by law. We are also prepared to state our intention to consent to such activities in future programs when we have sufficient information about them to make the necessary statutory determinations. It is not possible at this time to identify specific facilities which might be subject to an advance long-term consent arrangement since these matters are the subject of continuing negotiations. We will, of course, continue to keep the appropriate Congressional committees informed of significant development as these negotiations proceed.

Question 3. In recent conversations following the subcommittee hearing, DOE Deputy Assistant Secretary for Breeder Reactor Programs, Gordon Chipman, reiterated to minority staff his previous statement that the Barnwell, S.C., reprocessing plant was not needed to provide fuel for the Clinch River Breeder Reactor or the FFTF, because DOE has "assumed FFTF and Clinch fuel would come from Defense Programs". This appears to contradict Mr. Kennedy's statement at page 24 of this hearing transcript. How would you explain this discrepancy?

Answer 3. The statement at page 24, which indicates that we "do not have the plutonium needed for Clinch River . . . for FFTF" responded to the question of whether "we have adequate plutonium now to fuel all the upcoming breeder R&D that we have scheduled right now," and was expressed in the context of discussing the civilian breeder research and development program. To the best of my knowledge, there is not enough plutonium within the existing civilian nuclear program to provide fuel to these research projects over their 30-year lifetimes. This point was expanded in Deputy Secretary Davis' testimony following my own statement. Moreover, I see no reason to disagree with Deputy Secretary Davis when he said that drawing plutonium from military programs for Clinch River would not "see a very good prospect". Whether the Defense programs stockpile could be a source of such plutonium is a decision to be made by the managers of that stockpile.

Senator COHEN. The committee will stand adjourned.

[Whereupon, at 4:10 p.m., the subcommittee recessed, to reconvene at the call of the Chair.]

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

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Congress of the United States
House of Representatives
Washington, D.C. 20515

September 9, 1982

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The Honorable Charles H. Percy
Chairman, Subcommittee on Energy, Nuclear
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Dear Mr. Chairman:

This is in reference to hearings I understand your committee will be conducting today on issues related to domestic and international systems of management of plutonium. At the outset, I would congratulate you and your committee for undertaking a thorough evaluation of this complex and far-reaching policy issue.

It seems apparent that a discussion of the current status of the reprocessing of spent nuclear fuel in the United States would be required in any such deliberations. Therefore, I would like to take this opportunity to discuss issues relating to the potential start-up of the Barnwell Nuclear Fuel Plant in Barnwell, South Carolina, for the purpose of reprocessing spent fuel from commercial nuclear reactors. The Barnwell Nuclear Fuel Plant (BNFP), as you are no doubt aware, is one of three commercial fuel reprocessing facilities which have been constructed in the United States, none of which are in operation at this time (the other two being the Nuclear Fuel Services plant at West Valley, New York and the General Electric Co. plant at Morris, Illinois).

The present Administration has encouraged the private sector to develop commercial spent fuel reprocessing services as one of the key elements of their overall policy on nuclear power. It is my understanding that officials of the Department of Energy view completion and start-up of the BNFP as the most likely option available to fulfill that initiative. While I have not opposed a strictly private venture in the operation of BNFP, I am wary that the ultimate "package of assurances" which the federal government may offer a potential investor in the BNFP will render the operation of the plant only quasi-commercial in nature. Such assurances will necessarily entail the commitment of significant amounts of federal resources during this period of extreme fiscal austerity. I find this situation to be of extreme importance and believe the appropriate committees of Congress, such as your own, must thoroughly delve into the precise nature of any potential federal commitments offered to commercial reprocessors of nuclear spent fuel.

To further the above, therefore, I would respectfully request that during the testimony of the Deputy Secretary of Energy, W. Kenneth Davis, a line of questioning be pursued in order to determine the exact nature of any proposals being formulated within his Department for the purpose of providing "guarantees" and/or "assurances" to potential private operators of BNFP. To facilitate efforts in this regard, I enclose a copy of the "Cabinet Council Paper on Nuclear Fuel Reprocessing and the Barnwell Plant". Prepared by the Department of Energy, this document represents the considerable effort that has been devoted within

that Department towards determining the feasibility of commercial reprocessing in the United States, and what federal initiatives would be required to accomplish the start-up of this industry.

Upon review of this document, it will be noted that the option recommended for federal involvement in reprocessing is the "'Government Facilitated' Commercial Venture" (reference page 7). A closer examination will reveal, however, that this "Government Facilitated" concept entails several extremely significant guarantees to commercial reprocessors: "DOE will offer to negotiate acceptable means to protect investors in fuel reprocessing plants against changes in Government policy which could again prohibit commercial reprocessing", "DOE will begin negotiations with industry regarding Government purchase of quantities of plutonium sufficient to sustain the U.S. breeder development program and to facilitate limited utility mixed-oxide recycle investigations", and "DOE will work with the Department of State and industry to facilitate foreign involvement in a domestic reprocessing venture to the extent that such involvement is desired by potential investors and is consistent with U.S. nonproliferation objectives" (reference pages 8 and 9).

The above would suggest that the Department of Energy contemplates their role to be that of protecting operators of a commercial reprocessing venture against changes in the regulatory environment, providing a market for plutonium, as well as serving as broker to stimulate foreign investment in such a venture. Such significant federal involvement raises the very legitimate question of whether such a venture could in-fact be called "commercial". I believe it would be helpful if Deputy Secretary Davis could indicate whether the options outlined in this paper reflect the current state of thinking within his Department, as well as offering his response to more specific questions as outlined below:

* How would the Department of Energy "protect" investors in a commercial reprocessing venture? Would there be a commitment for the U.S. Government to buy the plant if a change in federal policy (through regulation, etc.) subsequently prohibited reprocessing?
* How much plutonium would be purchased under such an agreement, and what would be the likely annual appropriation for same? Is there any truth to reports that DOE will submit an FY84 request for appropriations of $250 million for purchase of plutonium? Is the $250 million figure representative of the recommendations of the Nuclear Energy division within DOE? and if not, on who's initiative was the figure increased?
* Does the purchase of $250 million worth of plutonium represent the approximate full core load capacity of the Clinch River Breeder Reactor?, and if so, for what purpose would the Department justify future purchases of plutonium? --- to stockpile?
* Assuming that several years time will be required to render the BNFP operational, why would DOE request FY84 appropriations to purchase plutonium from the plant?
* Would DOE and the Department of State solicit foreign investors, and/or users of the BNFP facility? and if so, whom?
* Reference is made on page eight of the draft report to "one respected element of industry..." which had "...stated publicly that it is confident this approach will succeed"(referring to DOE's recommendations). Who is this reference to?

* The second enclosure provided is a copy of Ashton J. O'Donnell's, Vice President of Bechtel National, Inc. presentation titled "Initiatives Required for Commercial Reprocessing". On page eight of this document, reference is made to the two basic conditions that he felt must be met by the Government in order to stimulate commercial reprocessing. Inasmuch as these two recommendations appear foremost in the DOE's draft plan for commercial reprocessing, did DOE rely upon Mr. O'Donnell's recommendations in formulating their own policy on this issue?
* Does the Department of Energy presently have any plans other than those above to either buy or lease the Barnwell Nuclear Fuel Plant for any purpose?
* Does the Department of Energy have any reservations about the operability and safety of the Barnwell Plant, especially in light of questions raised in this regard in a Department of Energy publication (reference enclosure #3: Worldwide Nuclear Power, page 36).

As suggested by the above, I question the propriety of a former official of the Bechtel Corporation developing and implementing federal policies which stand to directly benefit that commercial entity. As the original designer of the BNFP facility, as well as the leading force in expressing interest in the operation of the same, the Bechtel Corporation appears to realize significant potential gains from the types of guarantees being contemplated by the Department of Energy to facilitate operation of a reprocessing facility, and specifically, the Barnwell Nuclear Fuel Plant.

I greatly appreciate your time and consideration in the above, and look forward to working with you on this and related issues in the future. Please feel free to call on me if I may be of further assistance in any way. For your information, I would note that similar correspondence has been forwarded to the Ranking Minority Member of your committee, the Honorable John Glenn.

With kindest regards, I am

Respectfully,

BUTLER DERRICK
Member of Congress

D/ht
Enclosures (3)

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DRAFT
5/18/82

Cabinet Council Paper on Nuclear Fuel Reprocessing
and the Barnwell Plant

Introduction

On March 20, 1981, the President directed the Secretary of Energy to consult with industry, identify regulatory barriers to commercial reprocessing, and develop recommendations on how to improve the climate for private reprocessing efforts. Nuclear fuel reprocessing was also discussed in the President's statement on nuclear weapons nonproliferation of July 16, 1981, and the nuclear policy statement of October 8, 1981. More recently, in his April 28, 1982 statement on nuclear waste management legislation, the President reaffirmed his desire to encourage private sector reprocessing in order to provide access to significant remaining fuel value for future generations as well as significantly reduce the volume of high level waste.

Some elements of the nuclear industry have attempted to respond to the Administration's desires, but have made it clear that additional Government actions are needed in the immediate future if industry is to move forward. This paper explains why additional actions are urgently needed and provides recommendations on appropriate next steps by the Administration that should allow a private sector initiative to develop.

The Concept of Nuclear Fuel Reprocessing

Nuclear fuel gradually loses its ability to sustain the fission chain reaction necessary for power generation, and, after several years, it is considered "spent" and removed from the reactor core. Its inability to contribute longer to power generation results from the depletion, or "burnup," of most of the original uranium-235 content and by the buildup of waste fission products within the fuel which hamper the chain reaction.

When spent fuel is discharged from the reactor, approximately 96 percent of it by weight is reusable (94.4 percent is fertile uranium-238 and 1.4 percent is unused fissile uranium-235 and built-up plutonium). The remaining 4 percent is the "waste" portion of the spent fuel consisting primarily of fission products, which are responsible for over 80 percent of the heat and radiation emanating from 10-year old fuel. Physically, spent fuel looks very much like fresh fuel, but it has become highly radioactive and must be stored in a safe manner until it can be transported to a reprocessing plant, another storage facility, or possibly to an underground repository for permanent disposal.

Reprocessing is a chemical process for removing the wastes from the spent fuel and salvaging the reusable uranium and plutonium. The process begins by dissolving the fuel in an acid solution which is subsequently treated to partition the dissolved plutonium, uranium, and waste products into three separate streams. The solutions containing the dissolved plutonium, uranium,

and nuclear wastes are then independently treated to purify them and convert them into a desired solid form that can be stored, transported, reused in power reactors, or disposed of.

Historically, spent fuel reprocessing was viewed as an integral step in the nuclear fuel cycle which was required to recover unused uranium and plutonium and to facilitate the disposal of nuclear wastes. Use of the recovered uranium and plutonium in conventional nuclear power reactors would increase their fuel use efficiency by 30 to 40 percent. Through reprocessing and the use of the breeder reactor, the amount of energy generated from a given quantity of uranium will increase almost 70 times beyond that generated in a conventional reactor with no uranium and plutonium recovery.

To illustrate this point, it may be noted that about 8000 metric tons of spent fuel from U.S. power reactors are now being stored at reactor sites. This fuel has already generated approximately 1.9 trillon kilowatt-hours of electricity (the average U.S. household uses about 9000 kilowatt-hours annually). If reprocessed and reused in conventional reactors, this fuel would generate about 30-40 percent more electricity, or between .6 and .8 trillion additional kilowatt-hours. If reprocessed and used in conjunction with the breeder reactor, the existing inventory of spent fuel would produce about 70 times more electricity, or about 130 trillion kilowatt-hours.

To put this in perspective, the existing spent fuel inventory, if reprocessed and used in breeder reactors, would produce more than 50 times the total U.S. electrical power generation in 1981!.

History of U.S. Reprocessing Efforts

Three commercial reprocessing ventures were initiated in the United States with Federal Government encouragement over the past 2 decades, but all three ventures failed.

- The first plant, located at West Valley, New York, operated for about 5 years, but operations were discontinued as new Government safety regulations were promulgated which required a major capital investment for compliance.

- The second plant, constructed in Morris, Illinois, was never operated with radioactive spent fuel feed since "cold" tests disclosed significant process and equipment deficiencies. It is now in use to store spent fuel for its customers.

- The third plant is the existing facility at Barnwell, South Carolina, that was never completed because of changes in basic Federal policies regarding reprocessing. Specifically, concerns that the international spread of reprocessing technology could facilitate nuclear weapons proliferation gained popular support in the mid-1970's. Just prior to the 1976 elections, President Ford responded to these concerns by concluding that ". . . we should pursue reprocessing and recycling in the

future only if they are found to be consistent with our international objectives." This was followed in 1977 by President Carter's indefinite deferral of U.S. nuclear fuel reprocessing and the subsequent termination of Barnwell construction and licensing proceedings. The Barnwell owners, left with a facility costing nearly $300 million and no means of realizing a return on this investment, agreed to use the facility for testing new, advanced safeguards systems and other research before dismantling the plant to obtain a tax write-off and minimize their losses.

Since 1977, it has become clear that other countries intend to proceed with reprocessing regardless of its fate in the United States, indicating that the unilateral U.S. prohibition of domestic reprocessing did little to advance our nonproliferation objectives relative to other countries. Other countries, not having indigenous uranium resources and not capable of economically justifying an indigenous enrichment capability, continue to view their spent fuel as a valuable commodity and are seeking reprocessing services to realize this value.

It should also be noted that the situation in the U.S. has changed somewhat since 1977 in that nuclear electric generation is not projected to grow as fast as was projected earlier. To the extent these projections affect the demand and prices for uranium ore and uranium enrichment services, they also affect when a large number of reprocessing plants would be justified by enriched uranium prices alone. Nonetheless, it remains clear that as our installed nuclear power capacity increases, better uranium utilization, through breeder reactors and possibly mixed-oxide recycle in light water reactors, will require reprocessing. In any event, there are sufficient incentives to justify moving forward with at least one plant (e.g., the Barnwell Plant) in the near-term for reasons which are discussed in a later section of this paper.

President Reagan removed the ban on October 8, 1981, and took the position that reprocessing should be a private sector responsibility. While initial industry reactions to this position were highly negative, some elements of private industry have responded in a more positive manner during recent months. These more recent responses have shown that additional Government actions are required that recognize that nuclear fuel reprocessing has become a politically sensitive nuclear technology with unique business and economic risks which are strongly affected by uncertain and changing Government policies and regulations. Until these policies and regulations are clarified and reasonable stability assured, a private sector commercial reprocessing initiative cannot be expected.

Barriers to Commercial Reprocessing

The Federal Government is currently responsible for licensing of nuclear fuel reprocessing plants; for regulating nuclear materials transportation; for determining the allowable uses, hence value, of the recovered plutonium and uranium; for uranium enrichment pricing; and for determining the costs and schedule for disposal of the high level wastes from reprocessing. The

Federal Government will also determine the costs and schedule for the only other alternative to reprocessing spent reactor fuel, namely, the direct disposal of this fuel in a Federal repository. Further, State and local governments play a large role in the regulation of nuclear materials transportation and issues associated with public acceptance.

The fundamental regulatory structure for nuclear power endeavors is not likely to change, and no changes in the basic structure are being proposed by the Department of Energy. It is clear, however, that regulatory barriers to reprocessing can and must be reduced and stabilized at a level acceptable to industry before renewed interest in private reprocessing ventures can be expected.

More specifically, barriers to purely private reprocessing efforts exist which can be summarized in three categories:

1. Regulatory barriers to commercial reprocessing exist because of uncertainties in the time and costs required to license a reprocessing plant in today's environment. The uncertainties apply to the partially completed Barnwell plant in South Carolina as well as to any new plants which might be contemplated.

2. An equally important barrier results from industrial concerns that future changes in Government policy could again prohibit or make uneconomic commercial reprocessing as was the case under previous Administrations.

3. Finally, barriers exist because of unique economic uncertainties associated with the near-term markets for reprocessing services, the value of recovered products, and the costs of waste disposal. It should be noted that uncertainties regarding the costs and schedule for waste disposal should be significantly reduced or removed through passage of the pending waste management legislation.

These barriers preclude a positive and definitive economic analysis that private industry would traditionally consider as a prerequisite to investing in a long-term, capital-intensive venture such as reprocessing.

Incentives for Reprocessing

Nevertheless, there are national incentives for proceeding with nuclear fuel processing which can be summarized as follows:

1. Reprocessing recovers the large amounts of residual energy value (plutonium and uranium) in spent nuclear fuel and can extend the use of known uranium resources from several decades to several centuries when used in the breeder reactor. By preserving the relatively inexpensive uranium reserves that currently exist, the world's nuclear nations' energy supply can be enhanced. Prior to commercial deployment of the breeder, recycle of plutonium in light water reactors will be economic and desirable

assuming that sufficient quantities of plutonium are available and that uranium and enrichment costs increase in the future.

2. Reprocessing results in a high level waste form preferred for disposal. It allows for the separation of fission product wastes from the spent fuel and their incorporation into a uniform and well-characterized solid form especially engineered to assure these wastes will remain immobilized in a deep underground disposal environment for hundreds to thousands of years.

3. If a commitment to a U.S. reprocessing program is made soon, it can contribute to international weapons nonproliferation efforts, a U.S. reprocessing venture would be implemented in a way that demonstrates advanced safeguards systems and influences both the institutions and the technology used by foreign countries. U.S. leadership in reprocessing plant designs, particularly safeguards features, can have a positive influence on reprocessing plant design efforts in other countries. In addition, a U.S. reprocessing capability that would reprocess foreign fuels could provide a more economic alternative than small indigenous reprocessing facilities in foreign countries which do not have a sufficient number of nuclear powerplants to justify commercial scale reprocessing plants. The United States must be in a position of leadership and participation if we are to have a major influence in international nonproliferation efforts and keep to a minimum the number of small reprocessing plants that could be developed internationally and pose a proliferation risk.

4. LWR fuel reprocessing is a precursor to development of the breeder reactor fuel cycle and will be required to supply plutonium for the first commercial breeder reactor. The substantial amounts of plutonium needed by the U.S. breeder development and demonstration programs over the next several decades could be supplied through domestic reprocessing. There are no other domestic civilian sources for this plutonium, and the quantities necessary will likely not be available from the defense program.

5. Reprocessing will provide an alternative to continued storage of spent fuel at some nuclear powerplants and avoid many of the problems and costs associated with additional storage capacity. If near-term relief is not provided by a reprocessing plant, either the Government or private industry will need to provide additional costly facilities.

6. Reprocessing can significantly aid in the international marketing of U.S. light water reactors provided foreign fuels can be reprocessed in the United States. To the extent that other countries offer such services, their reactor suppliers are in a stronger marketing position than the U.S. reactor vendors.

A Major Additional Consideration - Foreign Participation

An element of industry within at least one foreign country, the Federal Republic of Germany, has indicated an interest in investing in and utilizing the services of the partially completed Barnwell Nuclear Fuel Reprocessing Plant in South Carolina. It is the DOE view that such participation is highly desirable to:

1. Re-establish U.S. leadership in international nuclear power programs and thereby strengthen U.S. influence in nuclear weapons nonproliferation matters.

2. Strengthen U.S. credibility as a reliable supplier of peaceful nuclear technologies and thereby assist U.S. industry in the marketing of U.S. light water reactors abroad.

3. Facilitate financing of domestic reprocessing operations.

Status of the Barnwell Plant - The Need for Immediate Actions

The United States presently has 79 power reactors with a combined electrical generating capacity of about 60 million kilowatts. These reactors generate almost 300 billion kilowatt-hours per year and produce wholesale revenues of around $9 billion. At the same time, these plants discharge about 1500 metric tons of spent fuel each year, which is equivalent to the design capacity of the Barnwell Nuclear Fuels Plant in South Carolina. The Barnwell plant represents the only near-term possibility for moving forward with commercial reprocessing and the production of solidified high level wastes suitable for ultimate disposal in a geologic repository.

However, the present owners of the Barnwell plant have stated their intention to abandon the plant at the end of FY 1982 unless new owners can be found or continued Government funding is provided for research and development at the facility. Further, the Congress is divided over the need to provide additional Government funding for Barnwell, and FY 1983 funds may not be allowed even though they have been requested by the Administration.

Under the Carter Administration, it was proposed that the Barnwell Plant be purchased by the Government and used solely as a large "Away From Reactor" storage facility for spent nuclear fuel. The State of South Carolina has opposed this concept on the basis that the fuel might be retained there indefinitely, making South Carolina a "dumping ground" for nuclear materials and wastes. On the other hand, a number of the South Carolina political leaders have indicated they would favor completion and operation of the Barnwell Plant in recognition of the local and National benefits that would result.

At the present time, political controversy continues regarding the possible uses of the Barnwell Plant. Thus, any proposal to complete the plant for reprocessing spent fuel will have to recognize these concerns and clearly

demonstrate the state and local economic and social benefits which will result from completion and operation of the plant.

Completion of the Barnwell Nuclear Fuel Plant represents the only practical means of achieving a domestic reprocessing capability within the next 10 years assuming conditions acceptable to the State can be met. The stated plans of the present owners to abandon the facility, and the current interests of potential domestic and foreign investors in maintaining the facility, require urgent efforts by Government and industry if the Barnwell plant is to be operated as a private venture.

Options for Renewed U.S. Efforts in Nuclear Fuel Reprocessing

Given the present conditions, it is the judgement of the Department of Energy and many, if not all, elements of the nuclear industry that private industry will not attempt to move forward with Barnwell or any other commercial reprocessing ventures without additional Government actions. During the past year, several options have been considered which would require varying degrees of Government action or involvement.

These options may be defined as follows in order of increasing Government involvement:

Option 1--"Classical" Commercial Venture--Requires no additional Government actions; assumes reprocessing will proceed when market forces dictate and Government policies are viewed as stable.

Option 2--"Government Facilitated" Commercial Venture--Requires limited additional Government actions to protect against future policy changes and assure a limited near term demand for services.

Option 3--"Comsat" Type Organization--Requires legislation to authorize private sector monopoly and define market.

Option 4--U.S. "Nuclear Fuel Corporation"--Requires legislation to establish mixed Government/private corporation; probably requires some Government financing.

Option 5--U.S. "Nuclear Fuel Authority"--Requires legislation to establish total Government responsibility and organization.

These options, along with a brief policy analysis of each, are presented in Table 1.

In considering the above options, it should be noted that the option designated "Classical" Commercial Venture is not likely to succeed for reasons stated previously and in Table 1. Moving to the other end of the spectrum, some responsible elements of the private sector felt strongly in early 1981 that a totally Government-funded and -operated U.S. "Nuclear Fuel

Authority" was necessary. To the President's credit, and for that matter to industry's credit, some industry positions have changed and appear to represent sincere attempts to move toward either the "Government Facilitated" Commercial Venture or the U.S. "Nuclear Fuel Corporation" options.

Thus industry has been responding to the President's policy and momentum toward a shared goal has been established. Industry now awaits a Government response to its initiatives, and given the needs for a domestic reprocessing capability, it is appropriate that the Government provide this response. The Department proposes the next steps described below.

Next Steps

1. The Government should decide to pursue the "Government Facilitated" Commercial Venture option whereby it would take limited actions described below to assist private sector reprocessing. At least one respected element of industry has stated publicly that it is confident this approach will succeed.

2. The President, recognizing that certain Government actions are required before private ventures can be seriously contemplated, should commit the Administration to assisting in the development of a domestic reprocessing capability by working with industry to develop the best means to proceed.

3. DOE should undertake the following limited actions on the behalf of the Administration to facilitate a private sector initiative:

   - o DOE will offer to negotiate acceptable means to protect investors in fuel reprocessing plants against changes in Government policy which could again prohibit commercial reprocessing. Such protection would include only changes in Government policy, and would not include normal business risks or the risk of technical failure.

   - o DOE will work with the Nuclear Regulatory Commission to provide an improved regulatory and licensing environment for reprocessing plants, while maintaining adequate protection of public health and safety.

   - o As has been proposed in a previous DOE paper, DOE will begin negotiations with industry regarding Government purchase of quantities of plutonium sufficient to sustain the U.S. breeder development program and to facilitate limited utility mixed-oxide recycle investigations. These Government purchases would be undertaken with the realistic assumption that a plutonium price can be negotiated that would be competitive with or less than the costs to obtain plutonium by alternative means. In addition, it should be possible for the Government to recover its plutonium acquisition costs by selling or leasing the plutonium to utilities that will use it in a revenue producing demonstration breeder reactor or a conventional reactor used for mixed-oxide fuel recycle investigations.

- o DOE will negotiate acceptable and unambiguous terms for accepting wastes from reprocessing plants in a manner that is consistent with legislation recently approved by the Senate and which will remove the uncertainties in cost and schedule for transferring such wastes to the Federal Government for final disposal.

- o DOE will work with the Department of State and industry to facilitate foreign involvement in a domestic reprocessing venture to the extent that such involvement is desired by potential domestic investors and is consistent with U.S. nonproliferation objectives.

- o DOE will participate, to the extent desired and appropriate, in discussions between potential investors in the Barnwell plant and any potentially affected State, local or Tribal Governments.

Summary and Recommendation to Cabinet Council

The establishment of a U.S. reprocessing capability for commercial nuclear fuels is a key requirement for development of an advanced nuclear economy. It serves both domestic and foreign policy objectives. Cabinet Council and Presidential approval to proceed with the proposed actions contained in this paper is therefore requested. A more detailed report to the President on the subject of commercial fuel reprocessing has been prepared by DOE to support this position.

"Classical" Commercial Venture	"Government Facilitated" Commercial Venture	"Consat" Type Organization
[illegible] 1. Free Market Conditions [illegible]al business risks [illegible]kets for Pu and U [illegible]sonable regulatory environment [illegible]aste management commitments Market Demand for Services Willing Investors	1. Improved Licensing Environment 2. Indemnification Against Government Policy Changes via Contractual Arrangements, Limited Loan Guarantees, Legislation, or Some Other Means. 3. Government Decision on Pu Disposition 4. Criteria for Government Acceptance of Waste 5. Government Policy to Promote Foreign Participation 6. Market Demand for Services 7. Willing Investors	1. Legislation to Establish Organization 2. Market Demand for Services 3. Willing Investors
1. Fully supports Administration philosophy 2. However, not feasible for fuel reprocessing due to Government involvement and controls (sensitive technology)	1. Supports Administration objective of achieving commercial reprocessing 2. Supported by some elements of private industry 3. Some required Government actions will be controversial and difficult	1. Would be "private sector" corporation 2. Requires legislation to authorize monopoly and define market (controversial and difficult)

U.S. "Nuclear Fuel Corporation"	U.S. "Nuclear Fuel Authority"
1. Legislation to Establish Mixed Government/Private Corporation	1. Legislation to Establish Federal Authority
2. Some Utility Financing	2. Funding by Loan or Sale of Securities
3. Government Guarantees for Principal and Interest on Bonds and Loans Obtained from Commercial Money Markets	3. Government Guarantees for Principal and Interest on Bonds and Loans Obtained from Commercial Money Markets
4. Government Loans	4. Government Loans
5. Possibly Congressional Appropriations	5. Possibly Congressional Appropriations
6. Market Demand for Services	6. Market Demand for Services
1. Initial increased Government responsibilities run counter to Administration policies.	1. Maximum Government involvement; contrary to Administration policies
2. Requires legislation to establish organization, provide Government authorities, guarantees, and funding, and require utility investment (controversial and difficult)	2. Requires legislation to provide total Government controls and funding (controversial and difficult)
3. Being promoted by some elements of the utility industry.	3. Could be funded by utility fees

INITIATIVES REQUIRED FOR COMMERCIAL REPROCESSING

by

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When Manny Gordon of the AIF invited me to participate in this Conference, Bechtel was at a very early stage in its review of Barnwell as a prospective reprocessing plant to be operated in the private sector. In exploring for a title, Manny said: "Initiatives required for commercial reprocessing," to which I responded: "It certainly is!"

Initiative IS required if we are to realize commercial reprocessing! "Initiative" is defined as an introductory step. The question we in the nuclear industry face is "Who should take that introductory step?"

Many of you will recall that the United States made substantial progress toward commercial reprocessing during the period 1962 to 1972. The underlying factors which made that possible included:

- A bipartisan commitment by successive Administrations to the nuclear power option, and to privatization of the nuclear fuel cycle;
- A supportive U.S. Congress, including the Joint Committee on Atomic Energy;
- Enabling legislation in the form of the Atomic Energy Act of 1954;
- A general feeling of mutual respect and understanding between the government and the private sector;
- A predictable regulatory environment.

You may dispute my choice of words; but, in principle, these were the essential elements of a generally healthy development of commercial nuclear power in the United States during the period 1962-1972. The tenor of the times can best be appreciated by some selected quotations* from the U.S. Atomic Energy Commission's Annual Reports to Congress for the years indicated:

1962: On July 26, 1962, Nuclear Fuel Services, Inc., filed an application under Section 104(b) for a construction permit and a license to operate a nuclear fuel chemical processing plant at the Western New York Nuclear Service Center....

1963: On April 30, 1963, a provisional construction permit was issued to Nuclear Fuel Services, Inc....

1964: NFS expects that the construction of this first privately owned reprocessing facility will be completed in the spring of 1965, and that the plant... will be ready to begin commercial operations early in 1966.

In August, the Dow Chemical Co. and Westinghouse Electric Corp. publicly announced a joint research and development program on advanced methods for reprocessing nuclear fuels.... In September, the General Electric Co. announced that it hopes to provide nuclear fuel processing services.

1965: On May 27, NFS was granted a license to receive and store "spent" fuel in the basin at its reprocessing facility.... The first irradiated fuel (from the Yankee reactor) was placed in storage in the NFS basin on June 5.

1966: A provisional facility operating license was issued on April 19 to NFS....

An application was received on November 22 from the General Electric Co. requesting authority to construct and operate an irradiated nuclear fuel processing facility at Morris, Illinois.... General Electric expects the plant to be operable by mid-1970.

Until 1966, the chemical processing of irradiated ("spent") fuels from reactors was done only in AEC facilities.... With the opening of the first privately owned fuel processing facility and industry interest in building other such plants, the AEC reassessed its future plans in this area.

* Appendix A includes the full text of the quotations referenced.

1967: The first private processing facility, NFS... continued the processing of irradiated reactor fuel....

Activities concerning other commercial plans pertaining to fuel processing include: (a) the General Electric Co., (b) Allied Chemical Corp., (c) National Lead Co., (d) Atlantic Richfield Co., and (e) Gulf Oil Corp.

On December 28, a provisional construction permit was issued to General Electric Co.... The ASLB conducted a public hearing on the application near the location in Morris, Ill., on November 28 and issued its decision on December 27.

1969: Construction progressed on the Nation's second privately owned irradiated reactor fuel reprocessing plant. An application for a third proposed plant was under AEC review, and a preliminary site evaluation was completed for a fourth such facility.

In June, the AEC published for public comment a proposed policy to govern the siting of commercial fuel reprocessing plants and the disposal of high-level radioactive liquid wastes....

1970: Nuclear Fuel Services, Inc., announced plans to modify and expand its West Valley, N.Y., facility over the next 5 years.

Construction continued during the year on General Electric Co.'s Midwest Fuel Recovery Plant....

Allied Chemical Nuclear Products, Inc., and Gulf Energy and Environmental Systems, Inc., have formed a partnership (AGNS) to construct and operate the third privately owned fuel reprocessing plant. A construction permit was issued by the AEC on December 18..... Construction is expected to be completed in 1973 and commercial operation is scheduled for 1974....

1971: The AEC's policy concerning the siting of fuel reprocessing plants, and providing that high-level radioactive liquid wastes must be converted to an AEC-approved solid form within 5 years and shipped to a Federal repository within 10 years after separation of the fission products from the irradiated fuel, became an effective rule on February 12.

Thus, the decade of the 60's was characterized by a sense of continuity, of shared responsibility between the private sector and the Government, of a

plan, of a commitment. With the momentum represented by the high level of industrial activity applied to reprocessing in the 60's, why is the outlook for commercial reprocessing in the United States so bleak and forebidding in the 80's? What happened in the 70's that enervated entrepreneurs, incapacitated investors, unnerved utilities, disenchanted Democrats and repelled Republicans?

While a combination of events adverse to nuclear power occurred during the 70's, presidential policy statements of October 1976 and April 1977 effectively terminated commercial activities in fuel reprocessing.

In fact, the April 7, 1977, policy statement of President Carter was a culmination of a series of events over the prior half dozen years. Significant events included the demise of the Atomic Energy Commission and of the Joint Committee on Atomic Energy; the growing controversy over environmental issues; the post Vietnam anti-establishment wave; and the detonation of a nuclear device in India in 1974. Through the decade of the 70's, the financial plight of U.S. utilities deteriorated and traditional conservatism of the financial institutions made it difficult to finance major projects in what was perceived as a high risk technology.

It is not our purpose to lament the 70's, but rather to address the 80's drawing upon the experience of the 60's.

A review of the 1962-1971 decade is truly nostalgic. NOSTALGIA is defined as "a desire to return in thought or in fact to a former time in one's life." That, of course, is not possible. But, is it possible to re-establish an environment conducive to the re-entry of the private sector in reprocessing? While this question cannot be answered with a strong affirmative at this time, a number of positive factors are emerging that justify substantial optimism.

The nuclear policies of the Reagan Administration provide an essential step toward restoring the commercial reprocessing option. Specifically, President Reagan's speech of April 8, 1981, supported the resumption of reprocessing and stated that the private sector is responsible for providing these services. This action reversed, in policy if not (yet) in practice, the Carter anti-reprocessing policy of April 7, 1977.

A further positive sign was the testimony on high-level nuclear waste on July 9, 1981, by W. K. Davis, Deputy Secretary of Energy, who stated that the Reagan Administration looks to reprocessing as the preferred method for managing high-level wastes.

In April 1981, U.S. nuclear industry and utility groups met with Administration representatives to discuss what actions the U.S. Government must take to attract the private sector into reprocessing.

The Administration's invitation appears to be a sincere request which justifies a careful re-examination of the situation. Bechtel has been engaged in such

an effort for the past several months, and I would like to share with you some of our findings, conclusions and recommendations.

First, there are several points I wish to make clear:

- Bechtel has not offered to purchase Barnwell from Allied-Gulf Nuclear Services;
- Bechtel has not joined with Westinghouse or any other U.S. or non-U.S. organization to form a consortium;
- Bechtel has not undertaken its evaluation of Barnwell in behalf of any government agency or other party.

We do believe that the nuclear fuel cycle should ultimately be closed and that reprocessing, recovery and waste technologies are available to achieve that goal. Barnwell represents an international asset which should be effectively utilized to achieve the numerous benefits of reprocessing. The private sector continues to be the most appropriate context in which to get the job done, assuming favorable government actions. There is unlikely to be a better time or more favorable circumstances to realize this objective. Indeed, proceeding without delay is critical--

- The AGNS partners may decide to write off their investment, dismantle the plant and disband the Barnwell staff resulting in loss of an experienced and valuable asset.
- The expressed interest of non-U.S. parties to assist in financing and in contracting for reprocessing services is an offer with a relatively short half-life.

Whereas the arguments for and against proceeding with reprocessing often focus on economics, there are many arguments favoring the reprocessing action:

- o The U.S. can re-establish its position as an active participant in international nuclear commerce, and thereby re-assert itself as a major influence in the development and application of international non-proliferation policies;
- o The spent fuel storage problems faced by utilities can be alleviated, thereby conserving funds for more productive purposes than amending provisions of spent fuel storage facilities;
- o High-level nuclear wastes can be converted into a safer and more manageable form;
- o Fuel-grade plutonium for use in fast breeder reactors can be produced, avoiding the necessity of diverting more valuable weapons-grade plutonium from stockpiles;
- o Permanent nuclear waste storage can be demonstrated, thereby assuring the public that a viable solution does, in fact, exist;
- o More effective utilization of uranium can be realized;
- o Overseas reprocessing activities and initiatives can be more effectively influenced by re-entry of the U.S. in this area.

Aside from these broad benefits, the market for reprocessing services appears secure. By 1988, the domestic fuel backlog will exceed 24,000 MTHM, sufficient to keep Barnwell operating between 16 and 20 years. Annual discharge rate from U.S. reactors by 1988 will be 3,000 MTHM, sufficient to feed two additional Barnwells. The cost of reprocessing represents less than 2% of total electric generating costs, before taking credit for recovered U and Pu.

If all of these favorable factors are real, why doesn't the private sector rush into the commercial reprocessing business? Very simply -- without some assurance that government policies will not revert to those of the Carter Administration, the risk is too great. The United States Government must

re-establish its credibility in the minds and hearts and the pocketbooks of the American entrepreneurs, the utilities and the financial institutions. We should seek a return to the context of the 60's -- not entirely possible, of course. But, the private sector has been asked by the Reagan Administration to state what actions the government must take to attract private enterprise back into reprocessing.

There is nothing to be lost by being as explicit as necessary under these circumstances. Two basic conditions must be met by the Government:

1. Assurance against EXPROPRIATION of investor capital.
2. Assurance of a predictable and stable licensing environment.

Absent favorable government response in these areas, it would be foolhardy for any private investor to place money at risk for Barnwell or any other private reprocessing facility.

You may think these two basic conditions are insufficient for re-entry of the private sector to commercial reprocessing. The practical tests of the adequacy of government response will be found in the form of contractual commitments resulting from negotiations between the owners of Barnwell, the utilities and the Government. If the financial community looks favorably upon such undertakings, if the utilities are prepared to commit for reprocessing services, if the Government is prepared to contract for the Pu, and for timely acceptance of a specified nuclear waste form, then a viable enterprise is conceivable."

In the course of our investigations, Bechtel has:

- Examined Barnwell from the standpoints of operability and maintainability;
- Performed economic analyses, including cost estimates, schedules, comparative studies;
- Undertaken preliminary financability studies;
- Met with present AGNS owners, as well as others who have expressed interest in the plant;
- Met with representatives of interested U.S. Government agencies (DOE, OSTP, OMB).

Progress to date has not uncovered any obstacles that would preclude a commercial venture. Our efforts lead us to believe that the Reagan Administration is firmly committed to re-establishing nuclear fuel reprocessing in the private sector, and that the U.S. Government must take steps to re-establish its credibility in domestic and international nuclear commerce. Assuming continuing favorable progress within the Administration, it is reasonable to anticipate a sound basis for proceeding with reprocessing in the private sector.

In the context of INITIATIVES REQUIRED and in response to my earlier question "Who should take that introductory step?", and as a result of our investigation, we conclude that:

> The next step must be taken by the United States Government. That step must be clear, unambiguous, responsive to industry and utility needs, and credible in the financial and international communities.

When that step has been taken, the private sector must be prepared to make a substantive response. Time is of the essence.

Resumption of government and industry collaboration -- as we had in the 60's will serve to return the United States to leadership in international nuclear affairs.

Appendix

Quotations from U.S. AEC Annual Reports as indicated.

1962: Chemical Processing Plant

On July 26, 1962, Nuclear Fuel Services, Inc., filed an application under Section 104(b) for a construction permit and a license to operate a nuclear fuel chemical processing plant at the Western New York Nuclear Service Center located in Cattaragus County, N.Y. The plant will engage in processing spent fuels primarily from reactors licensed by the Commission and reactors owned by the Commission. In a report dated October 11, 1962, the Advisory Committee on Reactor Safeguards stated that the site selected could be considered as suitable for a plant of the type and capacity proposed.

U.S. AEC Annual Report 1962
January 1963 (pg. 418)

1963: On April 30, 1963, a provisional construction permit was issued to Nuclear Fuel Services, Inc., and the New York State Atomic Research and Development Authority for a nuclear fuel chemical processing plant.... This action followed a public hearing and a decision by an AEC atomic safety and licensing board....

U.S. AEC Annual Report 1963
January 1964 (pg. 356)

1964: Fuel Reprocessing
Private Fuel Processing Plant

Status of NFS Plant. Construction of the Nuclear Fuel Services, Inc., (NFS) plant for the chemical processing of irradiated reactor fuels is proceeding. NFS expects that construction of this first privately owned reprocessing facility will be completed in the spring of 1965, and that the plant... will be ready to begin commercial operations early in 1966.

Activities by others. In August (1964), the Dow Chemical Co. and Westinghouse Electric Corp. publicly announced a joint research and development program on advanced methods for reprocessing nuclear fuels and techniques for fabricating plutonium fuel elements. The program will include construction of a $1.7 million Recycle Fuels Laboratory.

In September (1964) the General Electric Co. announced that it hopes to provide nuclear fuel processing services. Scope design is now in progress and initial plans are to begin construction in 1967 on a plant located in the West....

U.S. AEC Annual Report 1964
January 1965 (pg. 59)

1965: Privately Owned Fuel Processing Plants

Status of NFS plant. On May 27, 1965, NFS was granted a license to receive and store "spent" fuel in the basin at its reprocessing facility.... The first irradiated fuel (from the Yankee reactor) was placed in storage in the NFS basin on June 5. Since then, fuel receipts by NFS have consisted of both private and Government generated fuels. As of year's end, startup operations were nearing completion and it is expected that the plant will be available for spent fuel processing on a full-scale commercial basis early in 1966.

Activities by others. During February (1965), the General Electric Co. announced that it had awarded a contract to Fluor Corp., Ltd., for the design and construction of a nuclear fuel reprocessing plant tentatively planned to be located on the West Coast....

In March (1965), the Dow Chemical Co. advised the AEC that, after thoroughly reviewing its activities, potential contribution, and opportunities in the application of chemical technology to the processing of nuclear fuels, the firm had decided that continuation of its programs related to spent fuel processing was not justified....

The responses to a March (1965) AEC press release indicated that other domestic companies are considering having private fuel reprocessing plants in operation in the early 1970's. In April (1965) Allied Chemical Corp. announced an extensive nuclear fuels development program. The initial step will consist of a "cold" (non-radioactive material) pilot plant to provide chemical engineering technology for a commercial fuel processing plant using fluoride volatility technology....

U.S. AEC Annual Report 1965
January 1966 (pgs. 83-84)

1966: Fuel Processing Plants

Nuclear Fuel Services, Inc. A provisional facility operating license was issued on April 19 (1966) to NFS... authorizing operation of the irradiated nuclear fuel processing facility completed near West Valley, N.Y. Construction of the plant was authorized by an AEC construction permit issued April 30, 1963.

General Electric Co. An application was received on November 22 (1966) from the General Electric Co. requesting authority to construct and operate an irradiated nuclear fuel processing facility at Morris, Ill., adjacent to the site of the Commonwealth Edison Co.'s Dresden reactors. General Electric expects the plant to be operable by mid-1970.

U.S. AEC Annual Report 1966
January 1967 (pg. 62)

Fuel Processing and Radioactive Wastes

Until 1966, the chemical processing of irradiated ("spent") fuels from reactors was done only in AEC facilities to recover the useful by products -- radioisotopes, and uranium that is still usable in reactor fuel elements. With the opening of the first privately owned fuel processing facility and industry interest in building other such plants, the AEC reassessed its future plans in this area. Work continued to develop methods for reducing the highly radioactive solutions, resulting from chemical processing, to solids for easier storage.

U.S. AEC Annual Report 1966
January 1967 (pg. 109)

1967: Fuel Processing
Private Facilities

The first private processing facilities, NFS..., continued the processing of irradiated reactor fuel.... The first international safeguards inspection of a commercial spent fuel processing plant was conducted by a team from the IAEA during August and September (1967) at NFS during processing of the Yankee fuel.

Facilities Planned. Activities concerning other commercial plans pertaining to fuel processing include: (a) the General Electric Co. has been issued a permit to construct a one-ton per day plant near Morris, Ill.; (b) Allied Chemical Corp. has announced plans to have a multi-ton per day facility in operation by 1973; (c) National Lead Co. announced that it has initiated preliminary engineering studies for a multi-ton per day facility; (d) Atlantic-Richfield Co. announced that it has plans under study for a multi-ton per day plant to be located on the West Coast and in operation in the 1970's; and (e) Gulf Oil Corp. has initiated studies on fuel reprocessing methods and markets.

U.S. AEC Annual Report 1967
January 1968 (pg. 44)

Fuel Reprocessing Plants. On December 28 (1967), following an initial decision by an atomic safety and licensing board (ASLB), a provisional construction permit was issued to General Electric Co..... The ASLB conducted a public hearing on the application near the location in Morris, Ill., on November 28, and issued its decision on December 27.

U.S. AEC Annual Report 1967
January 1968 (pg. 129)

1969: Fuel Reprocessing Plants. During the year, construction progressed on the Nation's second privately owned irradiated reactor fuel reprocessing plant. An application for a third proposed plant was under AEC review, and a preliminary site evalutaion was completed for a fourth such facility.

As of December 31, 1969, General Electric's Midwest Fuel Recovery Plant (MFRP) under construction near Morris, Ill., was approximately 42 percent complete....

In April (1969) Atlantic Richfield Co. submitted a preliminary site evaluation report as a basis for AEC review of the suitability of a proposed site, near Leeds, S.C., for a plant designed for a daily throughput of 5 metric tons of spent fuel....

Evaluation continued on a reprocessing plant proposed by Allied Chemical Corp. Designed to process up to 5 metric tons per day of low-enriched reactor fuel, the facility would be located near Barnwell, S.C.

Reprocessing Plant Siting and Waste Disposal Policy. In June (1969) the AEC published for public comment a proposed policy to govern the siting of commercial fuel reprocessing plants and the disposal of high-level radioactive liquid wastes generated at these facilities. The objective is to give full consideration to public health and safety in this area while at the same time presenting minimum impediment to the growth of economic nuclear power....

Under the proposed policy, time and quantity limits are set for retention of high-level liquid wastes undergoing radioactive decay at the plant site before mandatory conversion to solid form and transfer to a repository. The AEC is to develop standards identifying acceptable solid forms for safe shipment to the Federal repository, and estimated fees to be charged.

U.S. AEC Annual Report 1969
January 1970 (pg. 148)

1970: Fuel Reprocessing Plants. Nuclear Fuel Services, Inc., announced plans to modify and expand its West Valley, N.Y. facility over the next 5 years. The plant, which is the Nation's first privately owned irradiated reactor fuel reprocessing plant, has been operating since April 1966....

Construction continued during the year on General Electric Co.'s Midwest Fuel Recovery Plant....

Allied Chemical Nuclear Products, Inc., and Gulf Energy and Environmental Systems, Inc., have formed a partnership (AGNS) to construct and operate the third privately owned fuel reprocessing plant. A construction permit was issued by the AEC on December 18, 1970.... Construction is expected to be completed in 1973 and commercial operations is scheduled for 1974....

On October 29 (1970), Atlantic Richfield Co. submitted a construction permit application for a reactor fuel reprocessing plant to be located near Leeds, S.C..... The scheduled operational date is mid-1976.

U.S. AEC Annual Report 1970
January 1971 (pgs. 92-93)

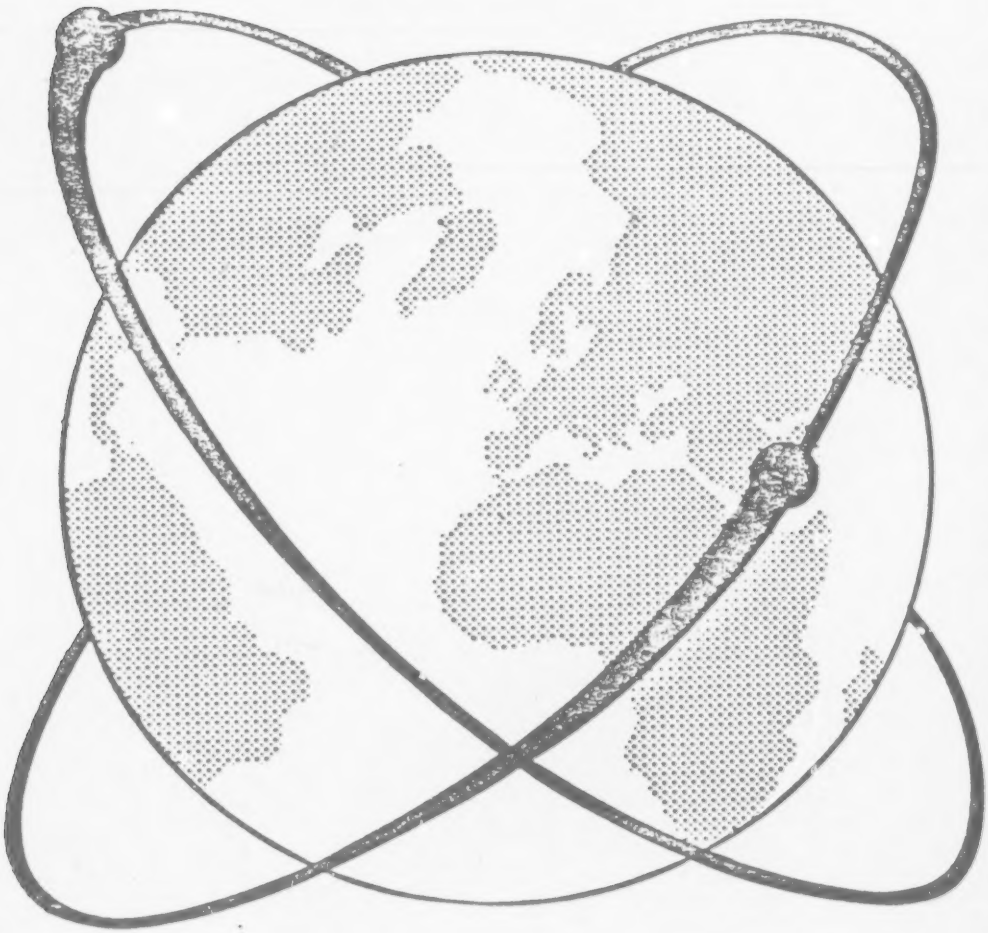
1971: Nuclear Fuel Reprocessing Plants. The AEC's policy concerning the siting of fuel reprocessing plants, and providing that high-level radioactive liquid wastes must be converted to an AEC-approved solid form within 5 years and shipped to a Federal repository within 10 years after separation of the fission products from the irradiated fuel, became an effective rule on February 12, 1971.

At year end, the AEC had under review an operating license application from General Electric Co..... The AEC also initiated a supplemental NEPA review of the construction permit for Allied Gulf Nuclear Services fuel reprocessing plant.... In November (1971), the Atlantic Richfield Co. withdrew its application for a permit to construct....

U.S. AEC Annual Report 1971
January 1971 (pgs. 53-54)

Worldwide Nuclear Power

JANUARY 1982



Prepared By:

THE OFFICE OF THE ASSISTANT SECRETARY FOR NUCLEAR ENERGY

U.S. DEPARTMENT OF ENERGY

INTRODUCTION

WORLDWIDE NUCLEAR POWER (WNP) is a companion volume to UPDATE. Our objective in the publication of WNP is to provide factual information on nuclear power programs and policies in foreign countries to U.S. policymakers in the Federal Government who are instrumental in defining the direction of nuclear power in the U.S.

This issue carries a comprehensive article on reprocessing facilities around the world. As U.S. nuclear domestic and foreign policies evolve the balance shifts among the various forces which contribute to its definition. In this connection a familiarity with existing reprocessing facilities around the world and plans for their use is important. I believe you will find this article interesting.

If you have questions or suggestions regarding the content of this report please contact either William W. Henoch, Office of the Assistant Secretary for Nuclear Energy, Department of Energy at (202) 252-4399, or J. Ross Humphreys, Jr., Office of Nuclear Programs, Department of Energy at (301) 353-3588.

Shelby T. Brewer
Assistant Secretary
for Nuclear Energy

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Barnwell Nuclear Fuel Plant

The Barnwell Nuclear Fuel Plant (BNFP) was built and is owned by Allied-Gulf Nuclear Services (AGNS), which is a 50-50 combine of Allied Chemical Corporation and a second combine consisting of Gulf Oil and Royal Shell. It was designed as a commercial reprocessing plant to reprocess LWR spent fuel at the rate of 1500 te/yr for completion in 1974. When construction was halted in 1976, work was largely (>90%) complete on the U/Pu separations facility and on the facility to convert the uranyl nitrate product to UF_6. New regulations issued after construction was well advanced forbid the shipment of plutonium as the nitrate and require that high-level liquid waste (HLW) be solidified within 5 years of production.

Although the cost of the basic plant, exclusive of the product conversion and high level waste tanks, was originally estimated to be about $300 million, AGNS has spent nearly $400 million (costs in 1978 dollars in this paragraph) on the facility to date. Since 1977, AGNS annually has received $13 million from DOE for short term research activities at BNFP principally related to safeguards (e.g., monitoring instrumentation) and spent fuel storage (high density, wet). It is estimated that an additional $100 million would be required to complete the plant as originally designed. An additional $400 (± $100) million is needed to install facilities for conversion to PuO_2 and for HLW solidification; most of the cost and uncertainty are associated with the latter process. AGNS has indicated a desire to sell the facility to the Government for $300 million; and if its annual subsidy is eliminated, it may abandon the facility. If the Government were to buy the plant, AGNS would consider operating it under contract. Because of a highly competitive situation that existed between AGNS and ARCO, both of which sought reprocessing contracts at rates of $20-30/kg with electric utilities, the plant design was strongly influenced so as to minimize capital costs. If the plant is mothballed, GAO estimates that 4 years will be required to return it to operating condition.

However, because of fundamental philosophical, dimensional and fabrication details of the design, full scale operation of the plant would be accompanied from the moment of startup by inordinately high operation and maintenance (outage time and cost) risks. With respect to operation and maintenance, the BNFP design and construction is unfortunately no better than that of the NFS plant (West Valley) in the event of mishaps in the liquid handling parts. The cells and contained equipment were not designed for remote maintenance, nor, it seems, was adequate attention given to space and other details for direct maintenance. Solid piping and welding, with inadequate space within the cells, complicates reasonable modes of recovery from severe contamination or damage events. Experience elsewhere indicates that these are important considerations. However, AGNS is confident that measures were taken in the design to assure continuous integral functioning of the equipment and control and movement of the process streams, such that maintenance considerations over a period of years will be minimal. In its design philosophy, the AGNS objective was "the plant should be maintenance-free, rather than designed for maintenance."

These potential operating problems, combined with the previously described licensing problems, are of sufficient magnitude that independent groups which have reviewed the EFFP are fearful that it could suffer the same fate as NFS's West Valley plant and give the industry a further black eye. Specifically, they fear that the first serious contamination in the liquid section of the facility might require that the entire plant be written off from further fuel reprocessing and, perhaps, other uses as well. Thus, the question arises as to whether the EFFP should ever be completed and be permitted to start up.

Exxon Nuclear Plant

The most suitable plant yet designed in the U.S. appears to be Exxon Nuclear's proposed commercial plant. This plant is described in detail in the Preliminary Safety Analysis Report (EN-FR-32) which was submitted to the Nuclear Regulatory Commission in 1976. The reference LWR-LEU fuel reprocessing plant considered in this study is based on a design by Exxon's nuclear fuel reprocessing engineering organization with the exception of a few features which were modified to meet the study requirements for the reference base plant. The major modifications included reducing the storage capacity for spent fuel from 7,000 to 465 tonnes, reducing the reprocessing capacity from 2,100 to 1,500 tonnes per year, providing for the dry storage of packaged cladding fragments from 10/years' production, and adding a tritium recovery and confinement system. Major design bases for the facility are listed in Table 3.

The reference plant, with a throughput capacity of 1,500 metric tons of heavy metal per year, will include facilities to receive and unload irradiated fuel assemblies from large shipping casks in a dry cell enclosure; the fuel storage pool will provide sufficient capacity to store approximately 465 metric tons of fuel (a 60-day inventory at full processing rate). A mechanical feed preparation system will provide for removal of fuel assembly and fittings and shearing of the fuel rods, and the exposed fuel core material will be dissolved in a continuous, rotary dissolver system. The reference plant will employ a Purex solvent extraction process for full partitioning and decontamination of the plutonium and uranium as nitrate solutions; three solvent extraction cycles will be provided for both plutonium and uranium. The plant also will include systems for the conversion of the product nitrates from solvent extraction: uranyl nitrate will be calcined to UO_3 and directly fluorinated to UF_6, which will then be packaged in standard cylinders for shipment; plutonium nitrate will be calcined to PuO_2 and packaged in stainless steel canisters. The plant also will provide storage capacity for an equivalent of 25 days' production of the plutonium oxide product. Aqueous high-level wastes will be concentrated, calcined, and converted to a borosilicate glass which will then be packaged in high-integrity stainless steel canisters. A high-level liquid waste storage capacity equal to 25 days of plant operation will be provided. A waste container storage pool will be provided adjacent to the fuel storage pool with sufficient capacity for 10 years' production of high-level waste canisters and other containers of heat-generating wastes, such as spent fission product sorbents and fuel hardware, plus 60 days' production of

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